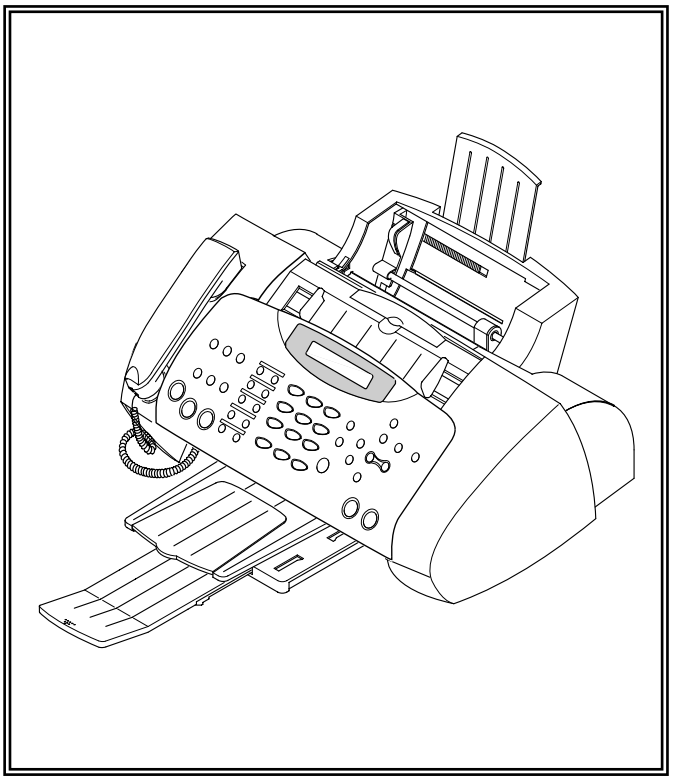
SAMSUNG

SAMSUNG FACSIMILE
SF-430

SERVICE *Manual*

FACSIMILE



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ELECTRONICS

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1. Precautions

Please read the following carefully to prevent any accidents and not to damage the unit during service.

1-1 Safety Precautions

1. Safety Precautions

There are some electric or machinery parts with safety related property. If the parts replaced are different from the original, the safety may not function. Even if the part could allow higher voltage than that of the part used, do not replace it and use a regular product clarified in specifications.

2. Be careful not to leave a switch, a cover or a safety device out when reinstalling or assembling the product after repair.

Especially mind the safety on the part with this mark.

You must use regular parts described in specifications for the parts inflammable and where the current can be flown. Otherwise any hazard such as an electric shock or a fire could occur.

3. Replacing Precautions

Do not change or add parts as you like. You cannot benefit from such a remodeled product at your will during the term of guarantee.

4. You must replace overheated or damaged parts or cords with regular products. Please solve the problem causing any damage or overheating and troubles beforehand.

1-2 Precautions on Disassembly and Reassembly

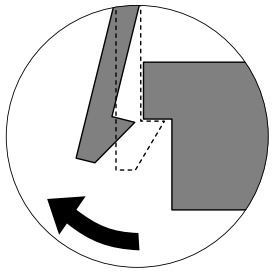
Very careful precautions should be taken when replacing parts. Before replacing, please check cables because you cannot put the cables that you removed for replacing parts into the proper place if you would not make sure of where they were connected and in which condition.

Please do the following before disassembling for a repair or replacement of parts.

1. Pull out paper cassette, printer cartridge installed. Especially careful not to be scratched by the surface of developer or not to expose them to light.
2. Turn the power switch off.
3. Take out the power plug, printer cable from the printer.
4. Use only the same type of part as original when replacing parts.
5. Do not force to open or fasten plastic material components.
6. Be careful that small parts such as screws should not get in the printer.
7. When disassembling, assembling, also observe small components are located in place.
8. If you uncover and turn the machine over to replace some parts, toner or paper particles may contaminate the LSU window. Protect the LSU window with clean paper.

Releasing Plastic Latches

Many of parts are held in place with plastic latches.
The latches break easily : release them carefully.
To remove such parts, press the hook end of the latch away from the part to which it is latched.



1-3 ESD Precautions

Certain semiconductor devices can be easily damaged by static electricity. Such components are commonly called “Electrostatically Sensitive (ES) Devices”, or ESDs. Examples of typical ESDs are: integrated circuits, some field effect transistors, and semiconductor “chip” components.
The techniques outlined below should be followed to help reduce the incidence of component damage caused by static electricity.

CAUTION:
Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

1. Immediately before handling a semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, employ a commercially available wrist strap device, which should be removed for your personal safety reasons prior to applying power to the unit under test.

2. After removing an electrical assembly equipped with ESDs, place the assembly on a conductive surface, such as aluminum or copper foil, or conductive foam, to prevent electrostatic charge buildup in the vicinity of the assembly.

3. Use only a grounded tip soldering iron to solder or desolder ESDs.

4. Use only an “anti-static” solder removal device. Some solder removal devices not classified as “anti-static” can generate electrical charges sufficient to damage ESDs.

5. Do not use Freon-propelled chemicals. When sprayed, these can generate electrical charges sufficient to damage ESDs.

6. Do not remove a replacement ESD from its protective packaging until immediately before installing it. Most replacement ESDs are packaged with all leads shorted together by conductive foam, aluminum foil, or a comparable conductive material.

7. Immediately before removing the protective shorting material from the leads of a replacement ESD, touch the protective material to the chassis or circuit assembly into which the device will be installed.

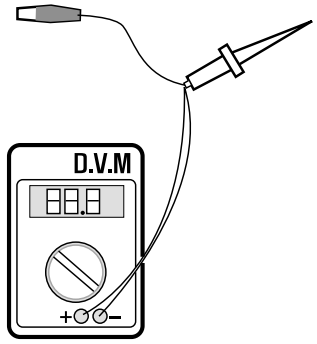
8. Maintain continuous electrical contact between the ESD and the assembly into which it will be installed, until completely plugged or soldered into the circuit.

9. Minimize bodily motions when handling unpackaged replacement ESDs. Normal motions, such as the brushing together of clothing fabric and lifting one’s foot from a carpeted floor, can generate static electricity sufficient to damage an ESD.

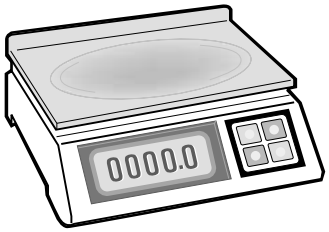
1-4 Tools for Troubleshooting

The following tools are recommended for safe and smooth troubleshooting described in this service manual.

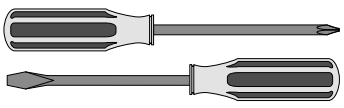
1 **DVM(Digital Volt Meter)**
Standard: Indicates more than 3 digits.



2 **Electronic Scale**
Standard: Equipment to check the weight of consumables supplied by Samsung Electronics.
(The gram unit can be measured.)



3 **Driver**
Standard: "-" type, "+" type (M3 long, M3 short, M2 long, M2 short).

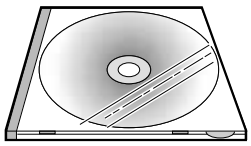


4 **Pinset**
Standard: For general home use, small type.

5 **Cotton Swab**
Standard : For general home use, for medical service.

6 **Cleaning Equipments a IPA(Isopropyl Alcohol)dry cloth or a soft stuff neutral detergent.**

7 **Software(Driver) installation CD ROM**



Note

Mind your hands not to be touched when you disassemble and reassemble PBA ASS'Y, such as the main board.

2. Specifications

2-1 Printer Engine

Technology		Thermal Inkjet
		2-pen & Print Head Swapping Type
Speed	Color	7 ppm at Draft Mode
	Mono	14 ppm at Draft Mode
Resolution	Color	True 600 X 600 dpi (2400 X 1200 dpi Addressable)
	Mono	True 600 X 600 dpi (2400 X 1200 dpi Addressable)
Printing Width		203mm
Feeding Method	Automatic	100 Sheets of 20lb cut sheets (Max 10mm)
	Manual Tray	No
Emulation		Host Based Printing (GDI)
Printer Driver		Windows 98/ME , Windows 2000/XP
Interface		USB(without HUB Mode) and Centronics 1284

2-2 Ink Cartridge

		Babbage mono standard	**Birch color**
Model No.		M50	C60
Print Head		208 nozzles	192 nozzles
Ink type		Pigment	Dye
Ink Color		Black (Babbage)	Color (Birch)
Ink Yield	Standard	about 600 sheets (5% Pattern, A4)	about 275 sheets (15% Pattern, A4)
	High yield	about 1075 sheets (5% Pattern, A4)	about 275 sheets (15% Pattern, A4)

2-3 Facsimile

GENERAL	Compatibility	ITU-G3
	Scan method	CIS , Sheet-feed
	Scan width	Max. 216mm, Effective : 210mm
	Scan Resolution	600 X 1200 dpi
	Transmission Speed	3 sec (standard resolution , MMR , 33.6 kbps)
	Scan Method	True color , 256 gray ,Block/White
	ADF	30 sheets of 20lbs
	Guide	Document Input Guide
	Stacker	Document Output Stacker/Paper Stacker
	Paper Tray	BIN Type (Without Manual Tray)
	Modem Speed	33.6 Kbps
	Coding Method	MH, MR, MMR, JPEG, Error Correction Mode
	LCD	2 Lines Each of 16 Characters
SCANNING	Resolution & Type	- Standard : 200 X 100 dpi - Fine : 200 X 200 dpi (Default) - Superfine : 300 X 300 dpi - Color : 200 x 200 dpi (Standard : Low quality, Fine : High quality compression)
	Contrast	Lightest/Lighten/Normal/Darken/Darkest/
MEMORY	Capacity (*3)	2 Mbyte
	Back-up Time	Minimum 30 minutes
	Confidential	No
	Forced Memory Tx.	Yes
	Memory Rx.	Automatic reception when paper empty.

(*3) Monochromatic CCITT NO. 1 CHART can be saved by 80 sheets per 1.0M Byte.

Facsimile (continued)

TELEPHONE	Speed Dial		70 Locations
	Chain Dial		No
	On-hook Dial		Yes, 1-Key
	Last Number Redial		Yes, 1-Key
	Auto Redial		Yes
	Hold & Mute		No
	Pause		Yes, Use Redial Key
	Ringer Volume		S/W Option Setting (4Steps)
	Tone/pulse Select		S/W Option setting
	DRPD		US : Yes, Other Country : No
REPORT & LIST	TX/RX Journal		Yes
	Image TCR		Yes, Reduction of First Page Sent by Memory Tx
	System Data		Yes
	Tel Number List		Yes
	Self Test		Yes
COPY	Multipage Copy		Upto 99 Pages
	Gray Scale		256 Levels
	Resolution		600 X 600 dpi
	Speed	Mono	10 cpm
		Color	5 cpm
	Zoom Range		20 % ~ 400 %
TEL I/F	Answering I/F		Yes
	Ext. Phone		1-jack, Extension Phone Transfer
OTHERS	Sensors		Paper Jam, Cover Open
	Real Time Clock		Yes
	RTI		Yes

2-4 Scanner

Compatibility	TWAIN
Technology	Platen CIS
Light Source for Color CIS	RGB LEDs (Line Order Control)

2-5 Power & Size

Power Source	220V~240V, 50/60Hz, 0.5A
Dimensions (W X D X H)	With the paper support and out tray retracted :439.8 X 326.6 X 192.9 mm
	With the paper support and out tray extended :439.8 X 602.5 X 192.9 mm
Weight (Packed Weight)	5.6Kg (8.0Kg: Packed Weight)

2-6 Accessaries

Tel Line	1EA
Power Cord	1EA
FAX Driver	1 CD - ROM
Ink Cartridge	INK-M50 (MONO) 1EA, INK-C60 (COLOR) 1EA
Manual	Yes
Carrier Sheet	No

3. Disassembly and Reassembly

3-1 General Precautions on Disassembly

When you disassemble and reassemble components, you must use extreme caution. The close proximity of cables to moving parts makes proper routing a must. If components are removed or replaced, any cables disturbed by the procedure must be replaced as close as possible to their original positions. Before removing any component from the machine, note the cable routing that will be affected.

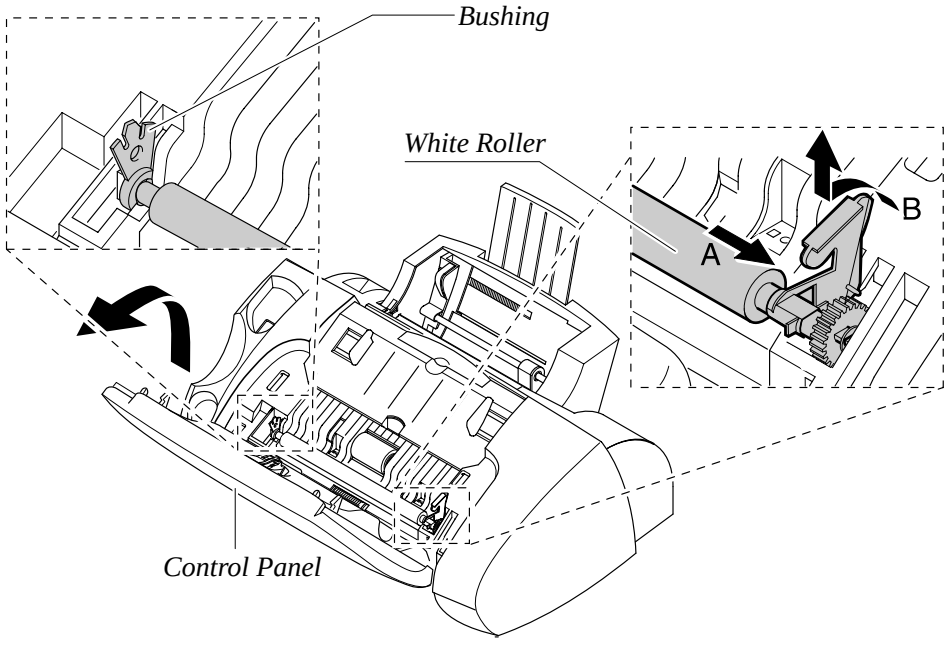
Whenever servicing the machine, you must perform as follows:

1. Check to verify that documents are not stored in memory.
2. Move the printer cartridge to far right to cap the nozzle.
3. Unplug the power cord.
4. Use a flat and clean surface.
5. Replace only with authorized components.
6. Do not force plastic-material components.
7. Make sure all components are in their proper position.

3-2 White Roller Ass'y

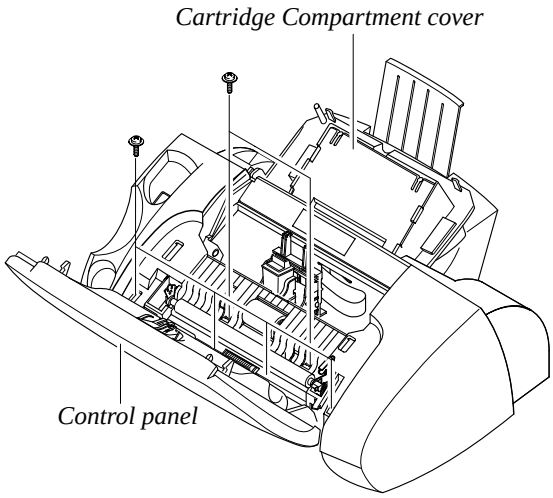
1. Lift the control panel using hand.
2. Push the bushing on both ends of the roller slightly inward, then rotate it until it reaches the slot as shown below. Then lift the roller out.

Note : Check the roller for any dirt. If dirty, wipe it off with soft cloth dampened with IPA (Isopropyl Alcohol). If the roller is heavily worn, replace it with a new one.

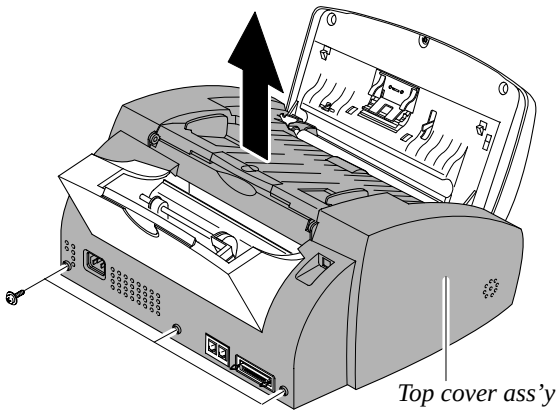


3-3 Top Cover Ass'y

1. Lift the control panel and open the print cartridge compartment cover. Remove the white roller ass'y. Remove the six screws shown below.



2. Remove the three screws shown below and take out the top cover ass'y.



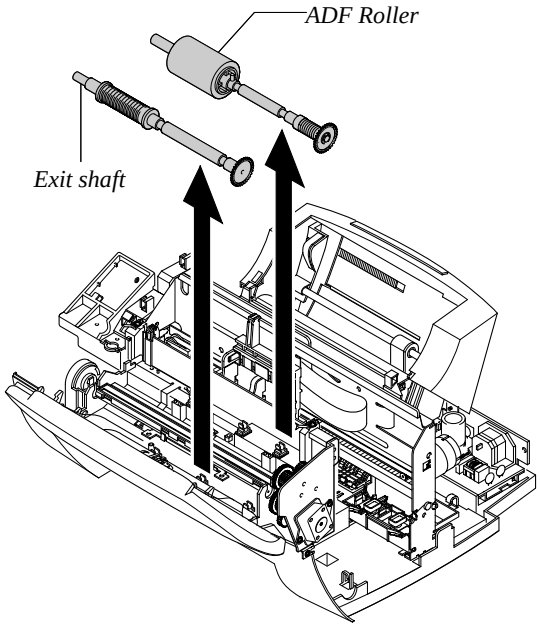
3-4 Base Ass'y

3-4-1 Rollers (ADF Roller, Exit Shaft)

1. Before you disassemble the rollers, you should remove:

   – Top Cover Ass'y (see page 3-3)

2. Take out the rollers from the base ass'y.



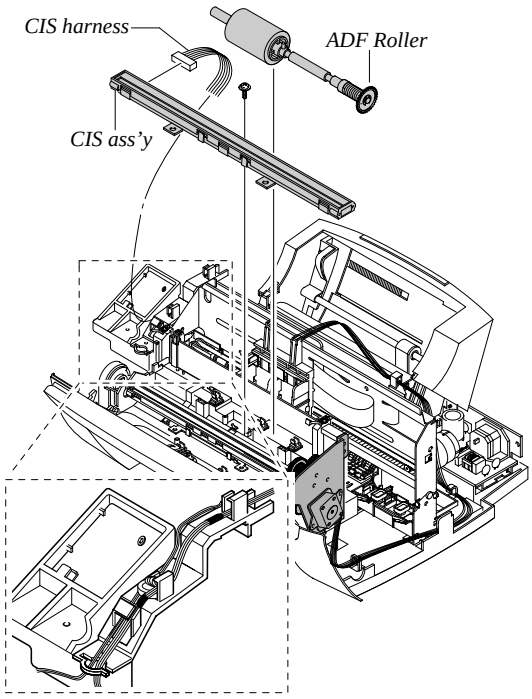
Note : Clean the surface of the rollers with IPA (Isopropyl Alcohol). After wiping them, you must dry them completely.

3-4-2 CIS (Contact Image Sensor)

1. Before you disassemble the CIS, you should remove:
   – Top Cover Ass'y (see page 3-3)

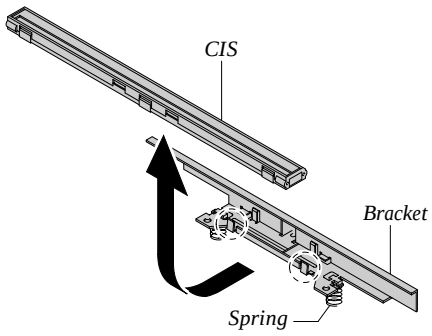
2. Remove the drive roller as described in '3-4-1 Rollers'.

3. Remove the one screw securing the CIS ass'y and unplug the CIS harness. Take out the CIS ass'y.



4. Unlatch two point then remove the CIS from the bracket.

Note: Be careful not to lose the springs.

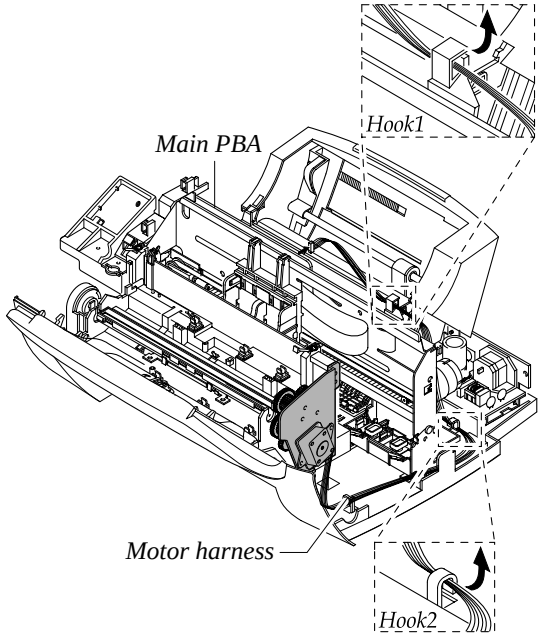


Note : Check the glassy surface of the CIS for any stain or scratch. If stained, wipe off with IPA (Isopropyl Alcohol). If it is heavily stained or scratched, replace it with a new one.

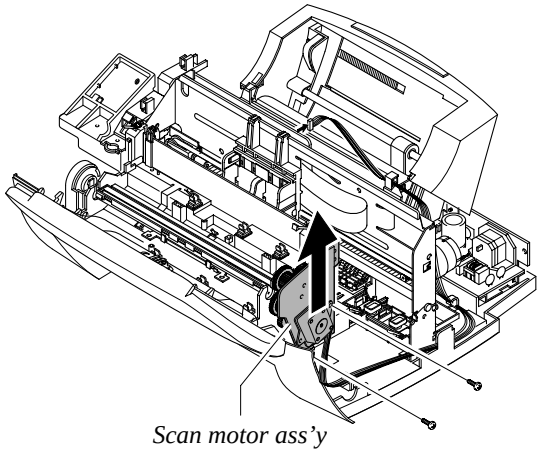
3-4-3 Scan Motor

1. Before you disassemble the Scan Motor, you should remove:
   – Top Cover Ass'y (see page 3-3)

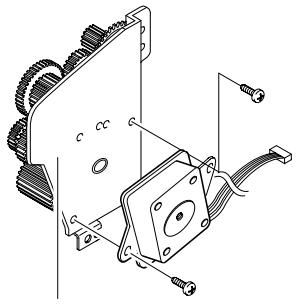
2. Unplug the motor connector from the main PBA. Make sure the harness is released from five hooks securing the harness as shown below.



3. Remove the two screws as shown below and take out the scan motor ass'y.



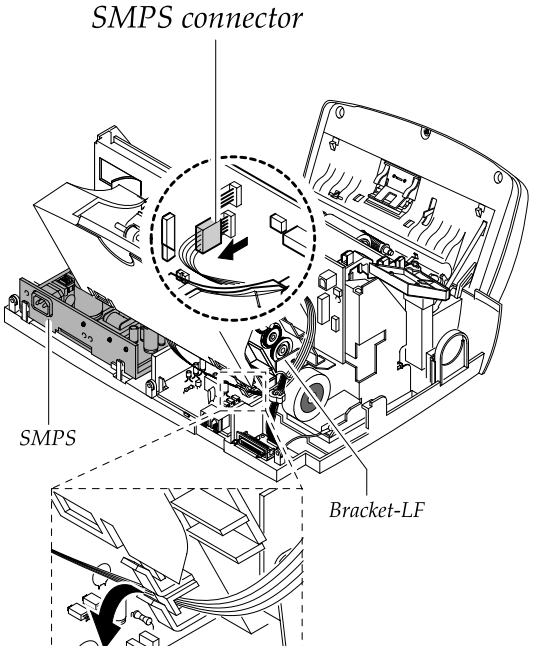
4. Remove the two screws securing the motor to the motor bracket.



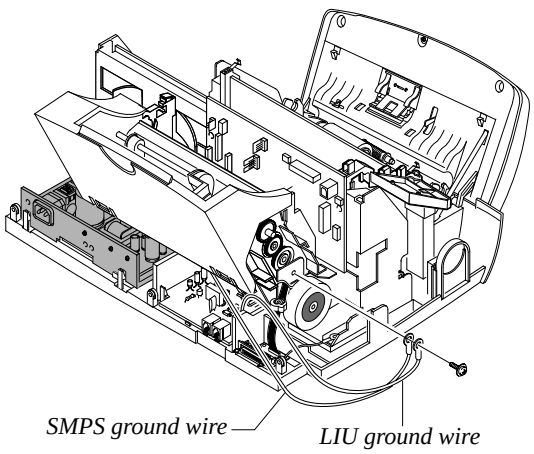
3-4-4 SMPS and Centronics B'd

1. Before you disassemble the SMPS and Centronics B'd, you should remove:
   – Top Cover Ass'y (see page 3-3)

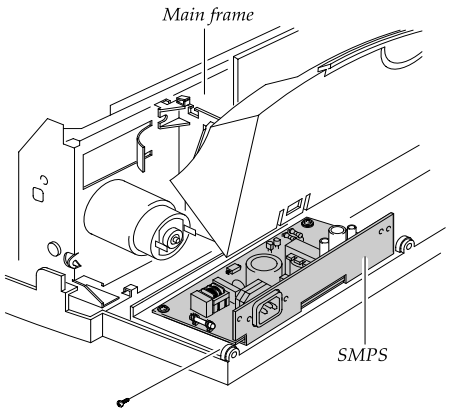
2. Unplug the SMPS connector from the Main PBA. Make sure the harness is released from the hook as shown below.



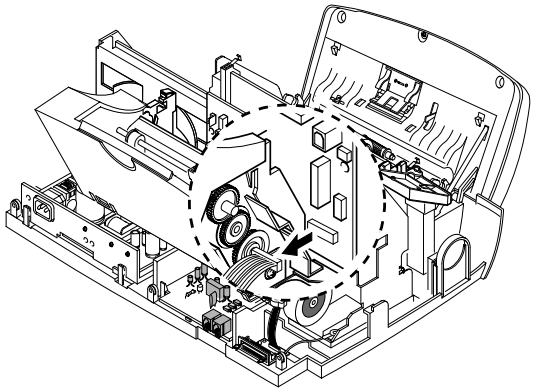
3. Remove the one screw securing the ground wires to the bracket as shown.



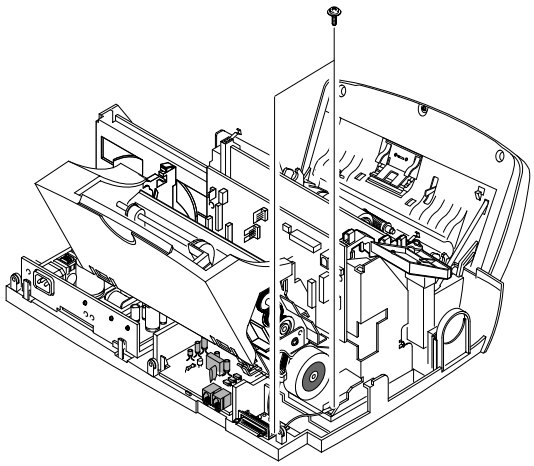
4. Remove the one screw securing and remove the SMPS to the Main Frame.



5. Unplug the Centronics B'd connector from the Main PBA.



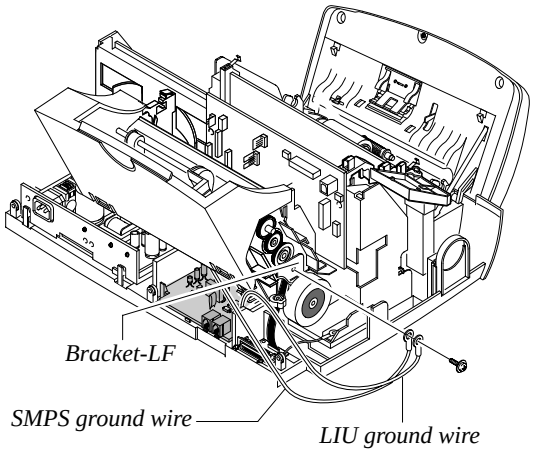
6. Remove two screws securing and then remove centronics B'd.



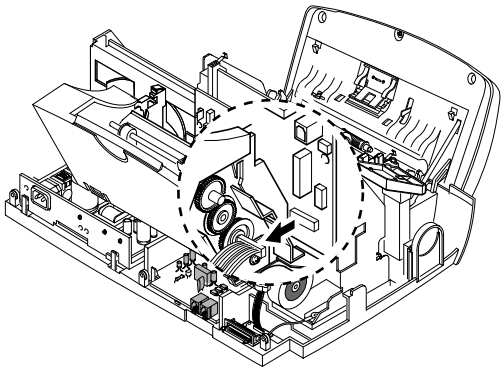
3-4-5 LIU PBA

1. Before you disassemble the LIU PBA, you should remove:
   – Top Cover Ass'y (see page 3-3)

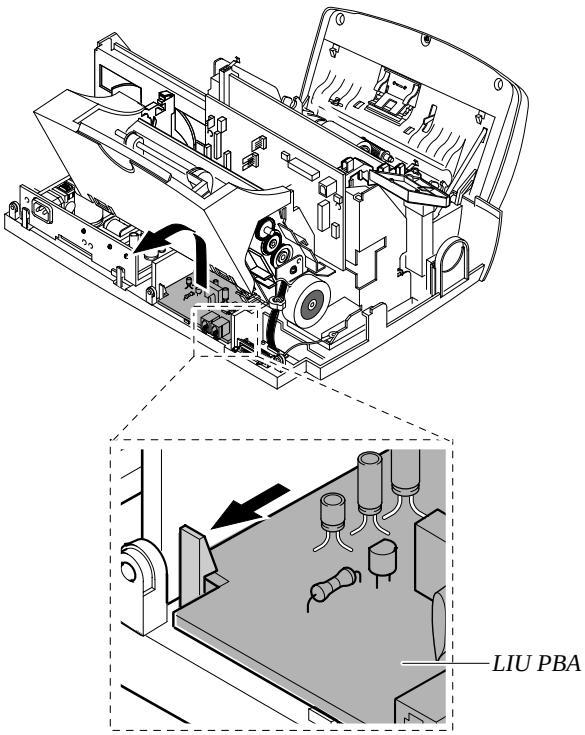
2. Remove the one screw securing the ground wires to the bracket.



3. Unplug the LIU connector from the Main PBA.



4. Pulling the snap fits locking the PBA outward, push up the LIU PBA.

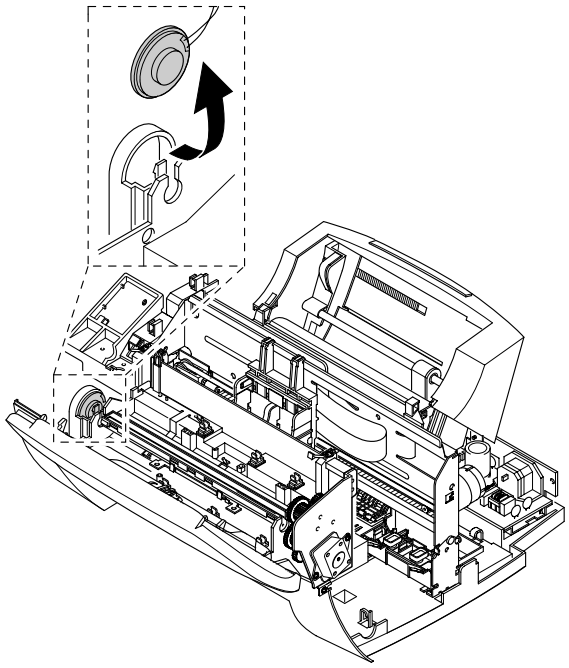


5. Unplug all the connectors from the LIU PBA.

3-4-6 Speaker Ass'y

1. Before you disassemble the speaker , you should remove:
   – Top cover Ass'y (see page 3-3)

2. Remove the speaker .

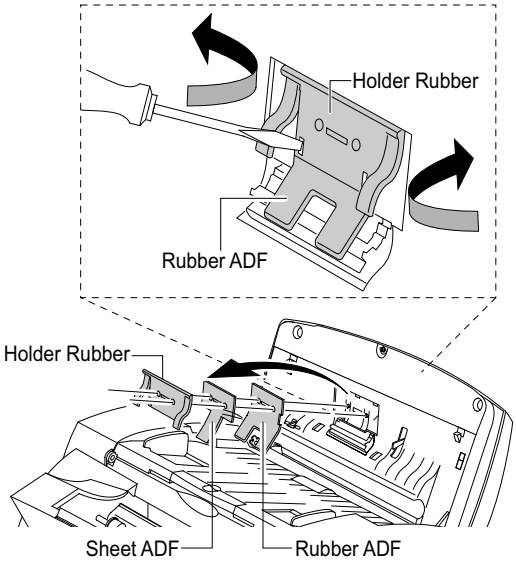


3-5 OPE Ass'y

3-5-1 ADF Rubber Pad

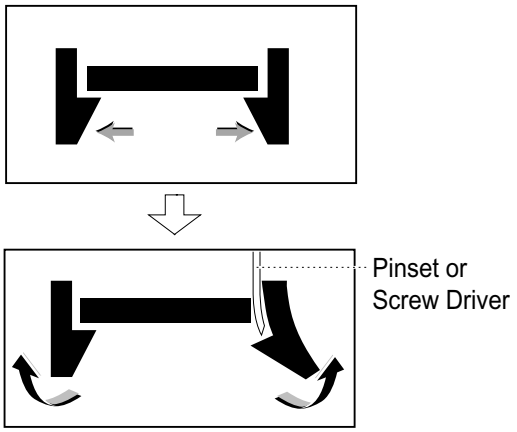
1. Open the OPE unit.

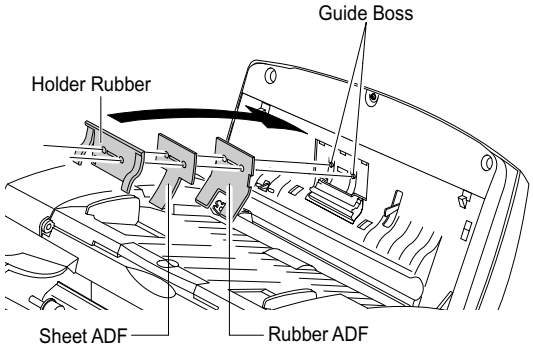
2. Insert a flat blade screw driver and pinset into the slot as shown below, and release the latches. Take out the Holder Rubber, Sheet ADF and the Rubber ADF.



⚠ Safely Precautions :

Do not force to open or fasten plastic material components.





Notes

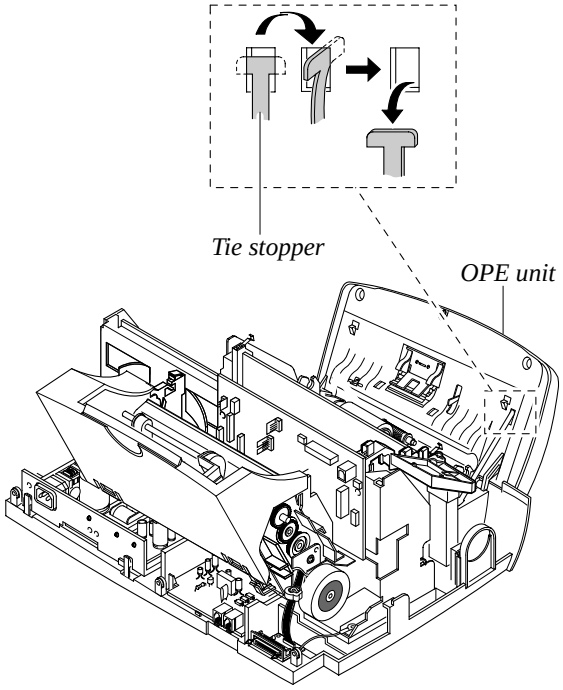
- When you reassemble the them, be sure that the Rubber ADF, Sheet ADF and Holder Rubber fit into the guide boss and the Holder Rubber latches fit into the corresponding hole. Then push firmly until it clicks.

3. Clean the surface of the rubber pad with IPA (Isopropyl Alcohol). After wiping it, be sure to dry it. Check the rubber wear. If the wear reaches 1/2 its original thickness, replace it with a new one.

3-5-2 OPE Unit

1. Before you disassemble the OPE unit, you should remove:
   – Top Cover Ass'y (see page 3-3)

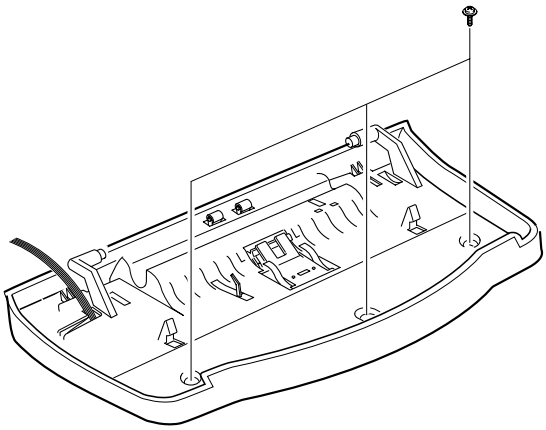
2. Turn the tie stopper 90 degrees as shown below and take out the OPE unit.



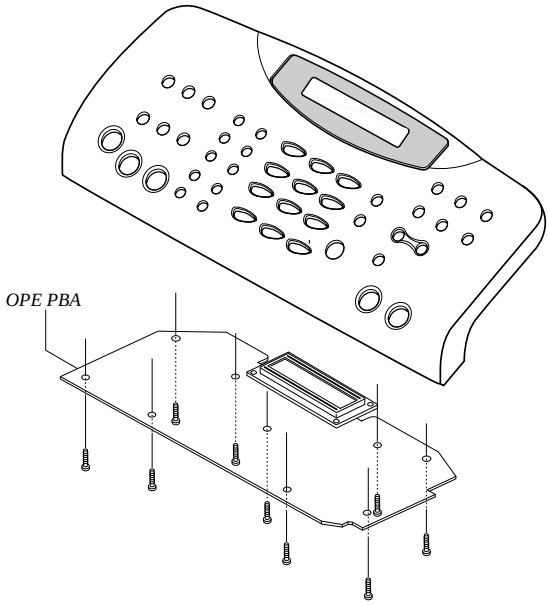
3-5-3 OPE PBA

1. Before you disassemble the OPE PBA, you should remove:
   – OPE Unit (see page 3-5-2)

2. Remove the four screws securing the OPE unit.



3. Remove the nine screw and take out the PBA with LCD.



Notes:
- Do not turn the OPE unit upside down after you remove the screws securing the PBA. Keys and rubber contacts may be separated and easily lost.
- When you reassemble the OPE unit, make sure the keys are in correct position.
- When you reassemble the PBA, secure the screws according in the order of the number printed on the PBA.
- After reassembling, operate the machine to make sure it works properly.
- After reassembling, make sure the LCD is not blocked.

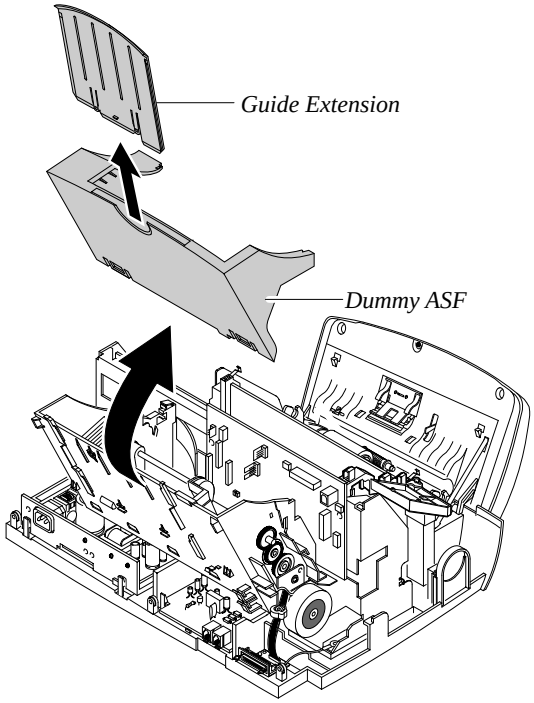
3-6 Printer Ass'y

3-6-1 Printer Unit

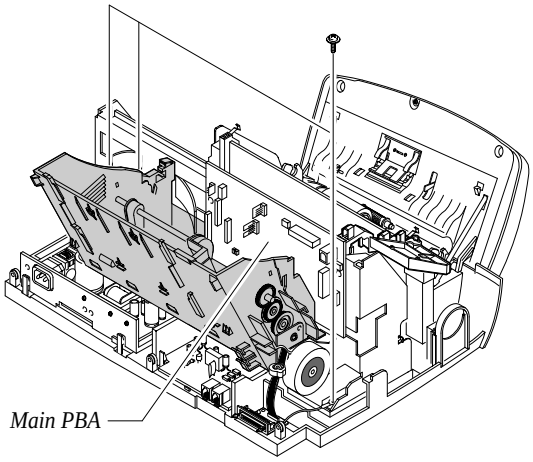
1. Before you disassemble the printer unit, you should remove:
   – Top Cover Ass'y (see page 3-3)

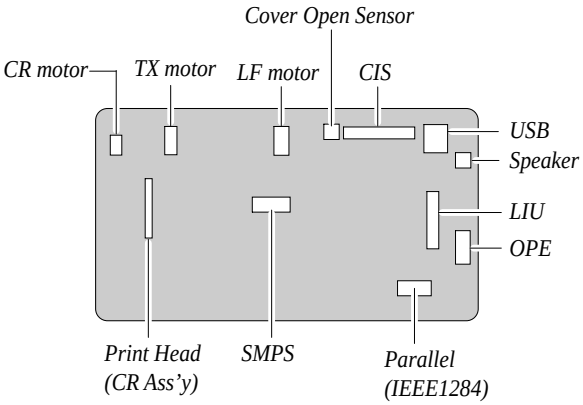
2. Take out the Guide Extension.

3. Take out the Dummy ASF.



4. Remove the three screws securing the printer unit, and unplug the eight connectors from the Main PBA. Take out the printer unit.



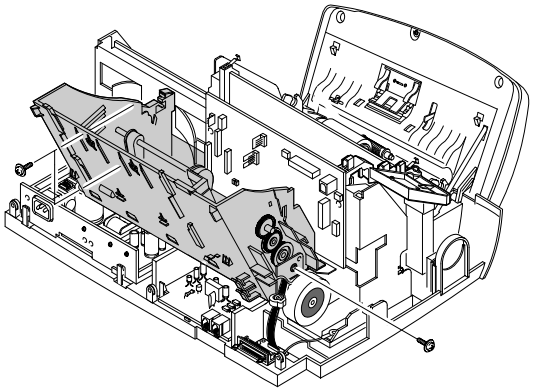


Note: When you reassemble the unit, do not pinch or short the wire harness.

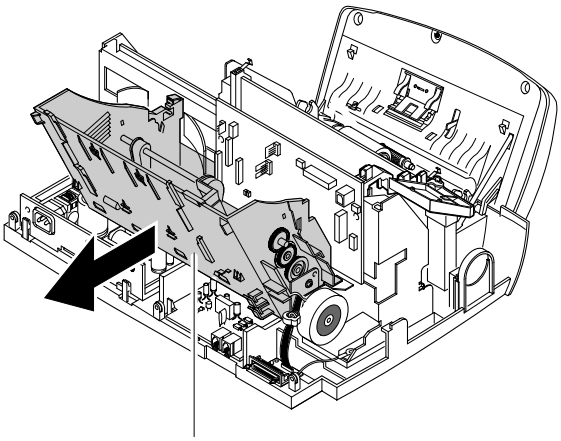
3-6-2 ASF Feeder Ass'y

1. Before you disassemble the ASF feeder ass'y, you should remove:
   – Top Cover Ass'y (see page 3-3)

2. Unplug all connectors from the Main PBA and remove the three screws shown below.



3. Remove the ASF feeder ass'y from the printer unit by pushing the tab inward and take the ass'y out in the direction of arrow.

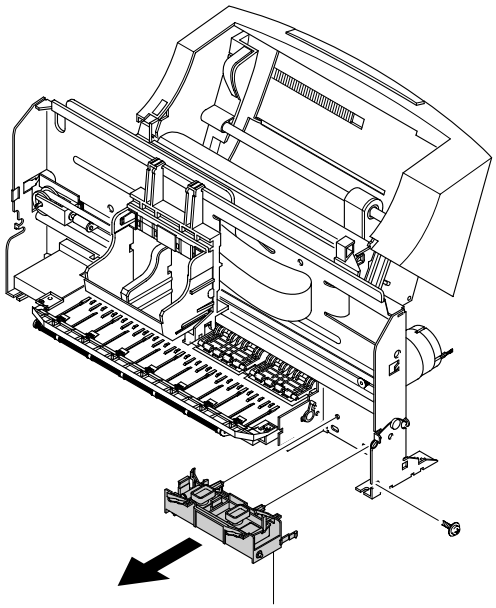


ASF feeder ass'y

3-6-3 Home Ass'y

1. Before you disassemble the home ass'y, you should remove:
   – Printer Unit (see page 3-6-1)

2. Remove one screw and pushing the both ends of the home ass'y, take out the ass'y in the direction of arrow.

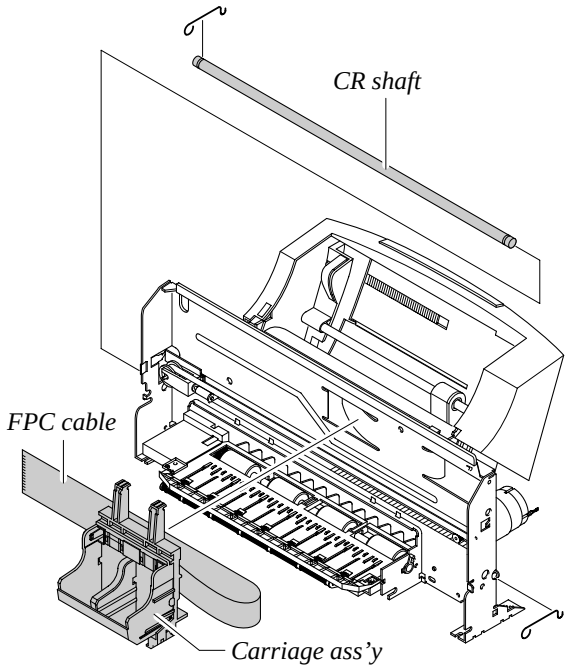


Home ass'y

3-6-4 Carriage Ass'y

1. Before you disassemble the carrier ass'y, you should remove:
   – Printer Unit (see page 3-6-1)

2. Take out FRC cable from the main PBA, take out 2 CR springs that fix CR shaft, and then separate carriage Assembly.



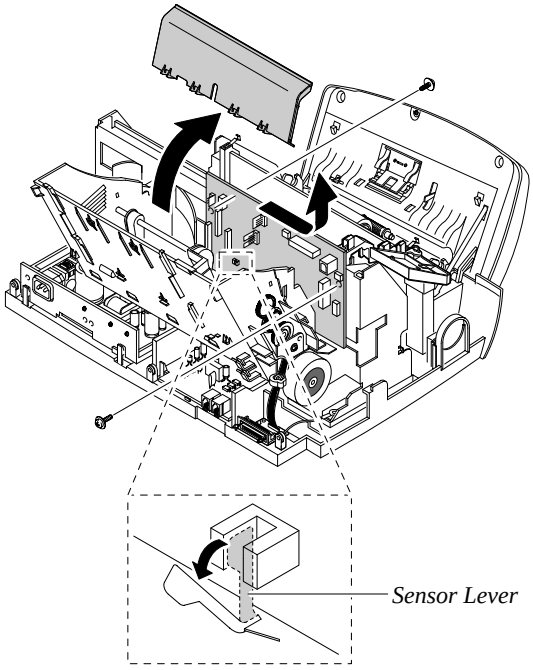
3-6-5 Main PBA

1. Before you disassemble the Main PBA, you should remove:
   – Top Cover Ass'y (see page 3-3)

2. Remove the two screw securing the Main PBA.

3. Unplug all connectors from the Main PBA.

4. Pull the sensor lever towards you and take out the Main PBA.

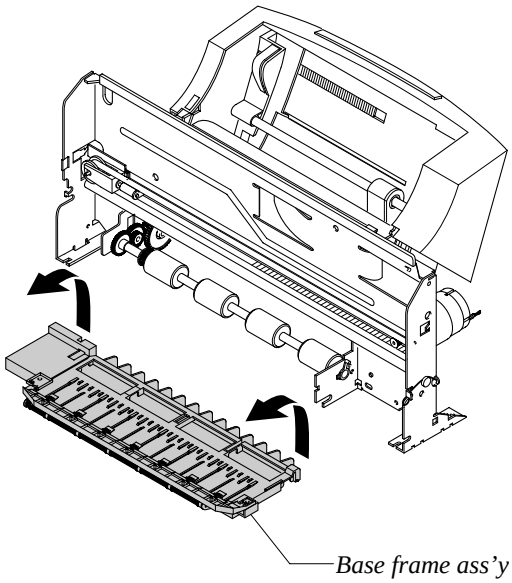


3-6-6 Base Frame Ass'y

1. Before you disassemble the base frame ass'y, you should remove:
   – Printer Unit (see page 3-6-1)
   – Holder Roller Ass'y

2. Remove the friction ass'y, then take out the actuator feed.

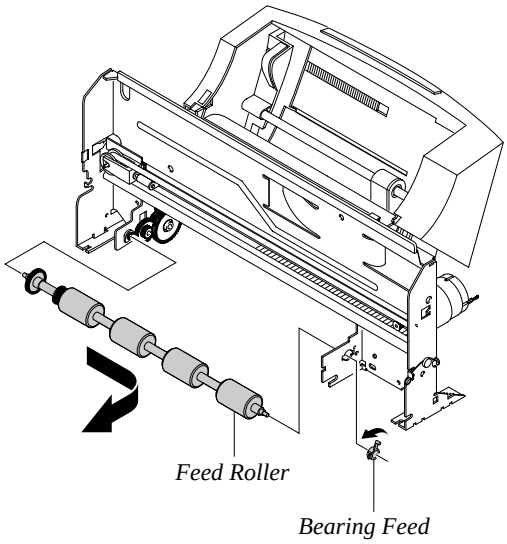
3. Pull out the base frame ass'y.



3-6-7 Feed Roller Ass'y

1. Before you disassemble the feeder roller ass'y, you should remove:
   – Printer Unit (see page 3-6-1)
   – Base Frame Ass'y (see page 3-6-6)

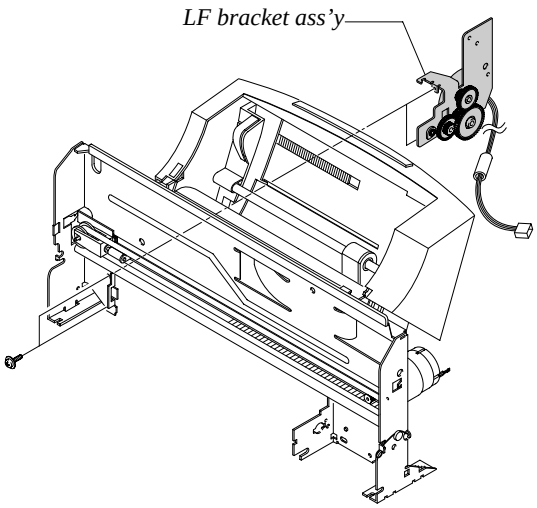
2. Remove the bearing feed from the main frame. Pull the feeder roller in the direction of arrow and take it out.



3-6-8 Line Feeder Bracket Ass'y

1. Before you disassemble the line feeder bracket ass'y, you should remove:
   – Printer Unit (see page 3-6-1)
   – Feed Roller Ass'y (see page 3-6-7)

2. Remove the two screws and take out the LF bracket ass'y.



4. Troubleshooting

4-1 Setting-up System in User Mode

FUNCTION	ITEM	CONTENT	DEFAULT
SYSTEM SETUP	FAX NUMBER/NAME	FAX NUMBER	
		FAX NAME	
	DATE FORMAT	EUROPE/USA	EUROPE
	DATE/TIME		
	LANGUAGE	ENG/GER/FRE/ITA/SPA/POR/DUT	ENGLISH
	DISCARD SIZE	0~30MM	20 MM
	RINGER VOLUME	OFF/LOW/MID/HIGH	MID
	ALARM VOLUME	ON/OFF	ON
	KEY VOLUME	ON/OFF	ON
	DIALING MODE	TONE/PAUSE	TONE
	CLOCK MODE	24HOURS/12HOURS	24 HOURS
	USB MODE	FAST/SLOW	FAST
	SET DEFAULT	CONTRAST	
		QUALITY	
		COPY PAGE	
		ZONE RATE	
		RESOLUTION	
FAX SETUP	SEND FORM MEMORY	ON/OFF	ON
	SENDING CONFIRM	ON/OFF/ERROR	ERROR
	FAX PAPER SIZE	LETTER/A4/LEGAL	A4
	AUTO REDUCTION	ON/OFF	ON
	SAVE TOLL TIME	START TIME _ _ : _ _	
	RINGS TO ANSWER	1-7 TIME	1
	STAMP RCV. NAME	ON/OFF	OFF
	RCV. START CODE	* _ *	9
	DRPD MODE	ON/OFF	OFF
	ECM MODE	ON/OFF	ON
	CALLER ID	ON/OFF	OFF
	AUTO JOURNAL	ON/OFF	ON
COPY SET UP	PAPER SIZE	LETTER/A4/LEGAL	A4
	PAPER TYPE	PLAIN/INKJET/PHOTO/TRANSPARENCY	PLAIN PAPER
	COLLATE	ON/OFF	OFF
ADVANCED FAX	BROADCASTING		
	DELAYED FAX		
	PRIORITY FAX		
	SEND POLLING		
	ADD SCHEDULE		
	CANCEL SCHEDULE		
REPORT/HELP	HELP LIST		
	SENT JOURNAL		
	RECEIVED JOURNAL		
	PHONEBOOK		
	SEADING CONFIRM		
	SCHEDULE INFORM		
	SYSTEM DATA		
	SELF TEST		
	CID LIST		
GROUP DIAL SET			
MEMORY CLEAR	FAX NUMBER/NAME		
	DIAL/SCHEDULE		
	JOURNAL		
	DEFAULT SETUP		
MAINTENANCE	CLEAN CARTRIDGE		
	ALIGN CARTRIDGE		
	VIEW INK LEVEL	"COLOR : _/8 , BLOCK : _/8"	
	ADJUST SHADING		
	REMOTE TEST	ON/OFF	OFF

4-2 Tech Mode

4-2-1 HOW TO ENTER TECH MODE

In TECH MODE, the technician can check the machine and perform various test to isolate the cause of a malfunction.

To enter the TECH MODE, press **MENU, #, 1, 9, 3, 4** in sequence, and the LCD briefly displays 'T', the machine has entered service (tech) mode.

While in TECH MODE, the machine still performs all normal operations.

To return to normal user mode, press **MENU, #, 1, 9, 3, 4** in sequence again, or turn the power off, then on by unplugging and plugging the power cord.

Options changed while in TECH MODE do not remain changed unless you clear the machine's memory.

Because the explanation of the User Mode items is already mentioned at the User guide in detail, It will not be described at Service manual.

4-2-2 Setting-up System in TECH MODE

FUNCTION	ITEM	CONTENT	DEFAULT
SYSTEM SETUP	MODEM TEST		
	DTMF TEST		
	ROM TEST	Display ROM version	
	PROGRAM DOWNLOAD		
	AGING TEST		
FAX SETUP	MODEM SPEED	2.4/4.8/7.2/9.6/12.0/14.4/28.8/33.6	26.4 KBPS
	SEND FAX LEVEL	0~15	-12 DBM
	RCV. FAX LEVEL	40~50	-43DBM
	DTMF HIGH LEVEL	00~15	8
	DTMF LOW LEVEL	00~15	11
	PAUSE TIME	1~9	4 SEC
	ERROR RATE	5%/10%	10%
	MAKE/BREAK RATIO	40/60~33/67	33/67
	CNG DETECT COUNT	1~4	2
	AUTODIAL TIMEOUT	30~150	55
	DIAL MODE LOC.	USER/TECH	USER
COPY SET UP	The same items as user mode.		
ADVANCED FAX	The same items as user mode.		
REPORT/HELP	HELP LIST		
	SENT JOURNAL		
	RECEIVED JOURNAL		
	PHONEBOOK		
	SEADING CONFIRM		
	SCHEDULE INFORM		
	SYSTEM DATA		
	SELF TEST		
	CID LIST		
	PROTOCOL DUMP		
	SHADING PRINT		
	ASF TEST		
GROUP DIAL SET	The same items as user mode.		
MEMORY CLEAR	ALL MEMORY CLEAR		
MAINTENANCE	CLEAN CARTRIDGE		
	ALIGN CARTRIDGE		
	VIEW INK LEVEL	"COLOR : _/8 , BLOCK : _/8"	
	ADJUST SHADING		PATTERN OUTPUT
	REMOTE TEST	ON/OFF	OFF

SYSTEM SETUP

• MODEM TEST :

Use this feature to hear various transmission signals to the telephone line from the modem and to check the modem. If no transmission signal sound is heard, it means that the modem part of the main board is poor.

• DTMF TEST :

DTMF (Dual Tone Multi Frequency) signal. When you press any key on the number keypad including * and #, you will hear the corresponding key tone.

• ROM TEST :

Use this feature to test the machine'S ROM. The result and the software version appear in the LCD display.

• PROGRAM DOWNLOAD :

Use this feature to download a new upgraded ROM file from a PC which is connected to the machine with a parallel cable (IEEE 1284).

< Download >

1. Connect printer to PC with a parallel cable(IEEE 1284.)
2. Select the ***PROGRAM DOWNLOAD*** function at the TECH MODE.
3. Input ***COPY/B FILENAME PRN*** at the MS-DOS and push the ENTER key.
   (filename : the latest ROM file name when the downloading)
4. After the download is completed, the system will be automatically initialized.

< Note >

Must perform the ***ADJUST SHADING*** after downloading a new ROM to adjust the standard value of the CIS.

• AGING TEST :

The function is to test the capacity of product in the production progress. Service person doesn't need to use it.

FAX SETUP

• MODEM SPEED :

You can set the maximum modem speed. Communication is done with modem speed automatically set at lower speed when communicating with the modem with lower speed since communication is done on the standard of the side where modem speed is low for transmission/reception. It is better set 26.4KBPS as default setting.

• SEND FAX LEVEL :

You can set the level of the transmission signal. Typically, the Tx level should be under -12 dBm.

⚠ Caution : The Send Fax Level is set at the best condition in the shipment from factory. Never change settings arbitrarily.

• RCV FAX LEVEL :

- You can set the level of the receiving signal.
- The reception level may be too low due to the cable losses.
- If it is set to -43 dBm, the reception sensitivity will be between 0 and -43 dBm. If it is set to -48 dBm, the reception sensitivity will be between 0 and -48 dBm.

⚠ Caution : The Send Fax Level is set at the best condition in the shipment from factory. Never change settings arbitrarily.

• DTMF HIGH LEVEL :

Select high frequency level when dialing in the MF mode.The input range is between 00~15dBm.

⚠ Caution : The Send Fax Level is set at the best condition in the shipment from factory. Never change settings arbitrarily.

• DTMF LOW LEVEL :

Select high frequency level when dialing in the MF mode.The input range is between 00~15dBm.

⚠ Caution : The Send Fax Level is set at the best condition in the shipment from factory. Never change settings arbitrarily.

• PAUSE TIME :

Pause time mean delay time (unit: second) inserted between dial number signal and the next number of signal in the automatic dial (One touch, Speed dial, Redial) and the manual dial.

⚠ Caution : The Send Fax Level is set at the best condition in the shipment from factory. Never change settings arbitrarily.

• ERROR RATE :

- When the error rate is about to be over the setting value, the Baud rate automatically lowers up to 2400 bps to make the error rate remain below the setting value.
- You can select the rate between 5% and 10%.

- **Make/Break RATIO :**
  Select the dial pulse make and break time: 40-60 or 33-67.

  Caution : Send Fax Level is set at the best condition in the shipment from factory. Never change settings arbitrarily.

- **CNG DETECT COUNT :**
  The function is to control the CNG TONE cognition times for entering receiving mode from the AUTO MODE or ANS/FAX MODE.

- **AUTODIAL TIMEOUT :**
  It is the certain time to be converting to STANDBY in case of a receiver doesn't answer when caller uses AUTO DIAL, such as ONE-TOUCH/SPEED DIAL/RESERVED SENDING and etc.

- **DIAL MODE LOC. :**
  The function is to take care the DIAL MODE SETTING, which is set in at USER MODE or TECH MODE differently by countries.
  If you select the USER MODE, you can choose DIAL MODE OPTION at the USER MODE.

4-2-3 REPORT/HELP

HELP LIST

It shows a brief description on the machine's basic functions and commands.
Use it as a quick reference guide

SENT JOURNAL.

This journal shows a specific information concerning transmission activities, the time and dates of up to 40 of the most recent transmissions.

RECEIVED JOURNAL

This journal shows a specific information concerning reception activities, the time and dates of up to 40 of the most recent receptions.

PHONEBOOK

It lists all telephone numbers that have been stored in the machine.

SENDING CONFIRM

It shows the result of the last send operation.

SCHEDULE INFORM

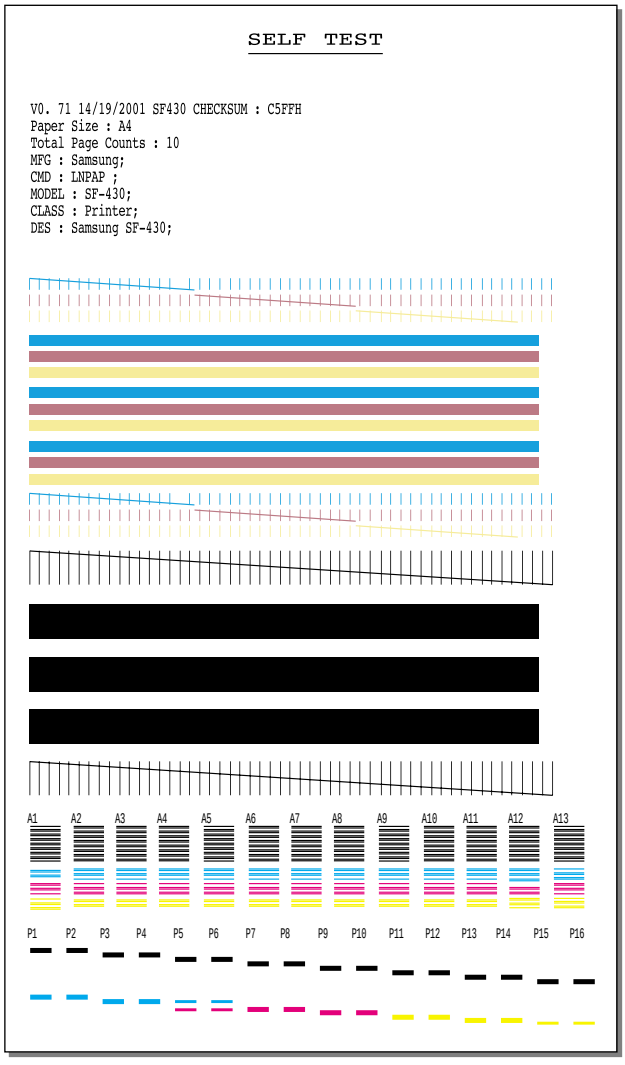
This list shows a specific information on the documents currently stored for delayed transmission. It provides the operation number, starting time, type of operation, etc.

SYSTEM DATA

This list provides a list of the user system data settings and tech mode settings.

SELF TEST

Using this pattern printout, you can check if the printer mechanism is functioning properly. Examine the pattern and look for a break in the diagonal line. If the diagonal lines are not broken, the printer mechanism is functioning properly.


SELF TEST
V0. 71 14/19/2001 SF430 CHECKSUM : C5FFH
Paper Size : A4
Total Page Counts : 10
MFG : Samsung;
CMD : LNPAP ;
MODEL : SF-430;
CLASS : Printer;
DES : Samsung SF-430;
A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13
P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13 P14 P15 P16

CID LIST

In the country which supports CALLER ID, information of the dates and numbers of calls is stored when RING is receiving.
(CALLER ID : it is a telephone service to send a caller's number to the receiver.)

PROTOCOL DUMP

This list shows the sequence of the CCITT group 3 T.30 protocol during the most recent sending or receiving operation. Use this list to check for send and receive errors. If a communication error occurs while the machine is in TECH mode, the protocol list will print automatically.

SHADING PRINT

With this print, you can check the scanning elements of the CIS Contact Image Sensor.

ASF TEST

The function is to test the function of ASF (AUTO SHEET FEEDER), and it is needed in the production progress. Service person doesn't need to use it.

4-2-4 Memory Clear

ALL MEMORY CLEAR

The function resets the system as its very first condition as setting in at the factory.

This function is needed to operate to reset the system to the initial value when the product is abnormally operated or malfunction. All the values are returned to the default values, and all the information, which set in by user, will be erased.

4-2-4-1 Method to use TECH MODE

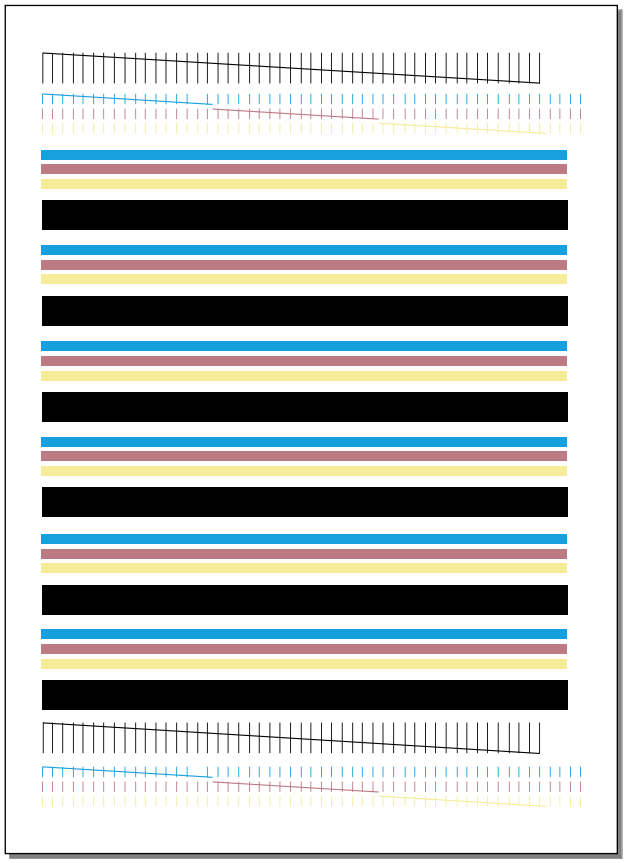
Perform the MEMORY CLEAR at the TECH MODE.

4-2-4-2 Method to use CANCEL BUTTON

1. Turn off the power.
2. Keep pushing the CANCEL button till the MEMORY CLEARING is shown up at the LCD panel.
3. Turn on the power.

4-2-5 Maintenance

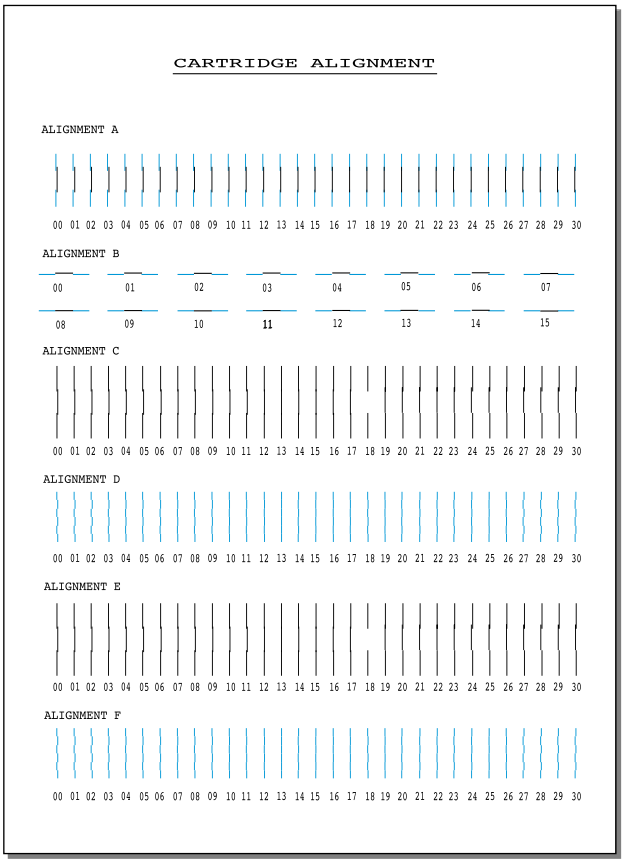
CLEAN CARTRIDGE



When white lines are appeared, when image is printed poorly in part, or when specific color is not printed, sweep the nozzle of the ink cartridge and contacting surface of the cartridge, then clean the cartridge.

Until it gets better, do it several times.

ALIGN CARTRIDGE



Using this feature to get fine print quality when a vertical line is printed not in straight or when ink cartridge is just replaced.

VIEW INK LEVEL

To check the amount of the mounted ink cartridge.

ADJUST SHADING

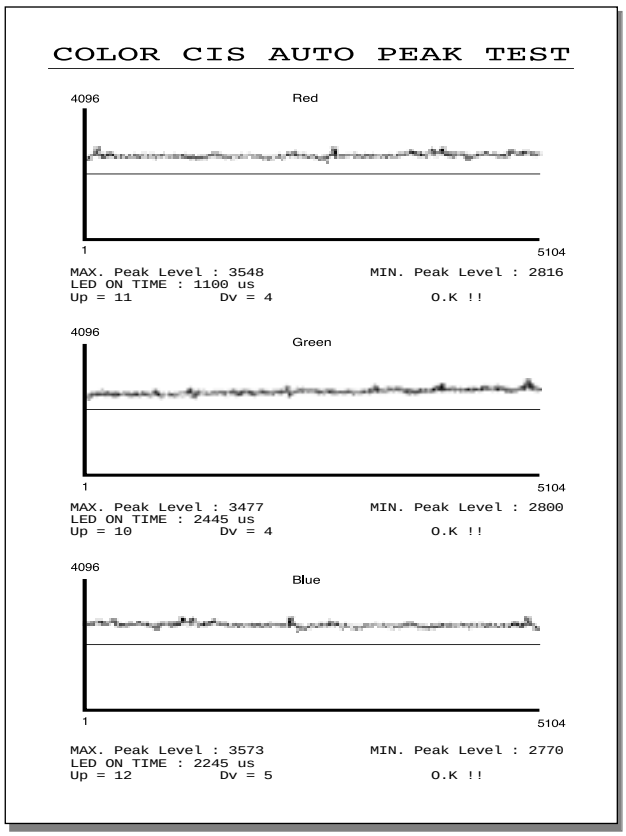
Use this adjustment feature to achieve best image (scan) quality depending on the characteristics of the CIS (Contact Image Sensor) parts.
Use this feature to correct the reference of the CIS if you experience bad copy images. When using this feature, a white paper should be used to get clean copy images.

1. Select [ADJUST SHADING] from the TECH MODE.
2. Insert a clean white original [Letter Size] into the paper loading part.
3. Original is scanned if pressing the Setting button.
4. If the original scan is completed, message is displayed on the LCD window and CIS SHADING PROFILE is output.
5. If the output image is different from the normal screen, the CIS is poor.

⚠ Caution:

1. Always perform the CIS TEST after downloading Firmware. Otherwise, the system may not operate properly.
2. Always perform ADJUST SHADING after replacing the CIS.
3. Always use a clean white paper in ADJUST SHADING (Maximum paper width: Letter Size).

ADJUST SHADING may be performed even in the User Mode but ADJUST SHADING profile is output only in the TECH MODE.



REMOTE TEST

The Remote Test feature can be enabled in order to allow a remote location to call up and run a diagnostic test on your machine. You may be instructed by a service representative to enable this feature.

4-3. Troubleshooting

4-3-1 Defective PC Scan . . . . . page(4-10)
4-3-2 Defective Image quality of PC Scan . . . . . page(4-10)
4-3-3 Defective Operation (LCD WINDOW ■■■) Display . . . . . page(4-11)
4-3-4 No Power . . . . . page(4-11)
4-3-5 Defective LCD Operation . . . . . page(4-12)
4-3-6 Defective Operation of Key Button . . . . . page(4-12)
4-3-7 Paper Jam . . . . . page(4-13)
4-3-8 Defective Paper Feed (1) . . . . . page(4-13)
4-3-9 Defective Paper Feed (2) -Display of NO PAPER . . . . . page(4-14)
4-3-10 Defective Document Feed . . . . . page(4-14)
4-3-11 Multi-Feeding (1) . . . . . page(4-15)
4-3-12 Defective ADF . . . . . page(4-15)
4-3-13 Defective Sensing-ink . . . . . page(4-16)
4-3-14 Defective Sensing-paper . . . . . page(4-16)
4-3-15 Defective Motor Drive (LF) . . . . . page(4-17)
4-3-16 Defective Motor Drive (CR) . . . . . page(4-17)
4-3-17 Defective Motor Drive (TX) . . . . . page(4-18)
4-3-18 Blank Page Print Out (When Copying) . . . . . page(4-18)
4-3-19 Blank Page Print Out (When Receiving) . . . . . page(4-19)
4-3-20 Vertical Black Line (When Copying) . . . . . page(4-19)
4-3-21 Vertical Black Line (When Receiving) . . . . . page(4-20)
4-3-22 Contaminated Stains on Paper . . . . . page(4-20)
4-3-23 Bad printed Image . . . . . page(4-21)
4-3-24 Vertical Lines are printed crookedly . . . . . page(4-21)
4-3-25 Bad Color (Intensity) . . . . . page(4-22)
4-3-26 No Dial Tone . . . . . page(4-22)
4-3-27 Defective MF DIAL . . . . . page(4-23)
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- *The solutions of troubleshooting in this 'Service Manual' explain the expected causes and how to check according to each problem and describe how to replace the defected parts (unit of ASS'Y) if necessary.*
- *The contents of this 'Service Manual' describe general ones only among many kinds of problems and causes while using the Product.*
- *The contents of this 'Service Manual' describe mainly technical explanations of the Product H/W and parts on the assumption that there is no problem in S/W.*

4-3-1 Defective PC Scan

• **Description**	The PC Scan is not functioning at all.
• **Location**	1.Cable (USB or Parallel) 2.Driver 3.OPE ASS'Y

Check and Cause	Solution
1. Check the Cable (USB or Parallel)	1. If the PC and the cable are not connected properly, reconnect it.
2. Check if the driver is installed properly.	2. After confirming that it is proper by performing a PC printing test related to driver setup, if it is not so, reinstall it. (Refer to User's Manual.)
3. Check if ADF (Automatic Document Feeder) operates normally. Insert and then copy several sheets of document, and confirm if they are feeding in order.	3. Check the malfunction of ADF by copying, if it is so, then test it again by replacing OPE ASS'Y(D_Det, D_Sensor). If the malfunction still occurs, replace the main PBA.

4-3-2 Defective Image Quality of PC Scan

• **Description**	The image PC scanned is not clear or bad.
• **Location**	CIS ASS'Y

Check and Cause	Solution
1. Check the waveform form by performing a CIS test in TECH Mode. (Refer to 4-2)	1. If the CIS waveform form is abnormal, try to replace CIS ASS'Y.
2. Check if the resolution is set too low in PC Scan options. (Refer to User's Manual.)	2. If the resolution is set to low, let the user be acquainted with the using method well.
	Notes : After replacing the CIS ASS'Y, a CIS test must be done (using pure white papers).

4-3-3 Defective Operation (LCD WINDOW ■ ▮D■splay

• **Description**	Strange characters are displayed on the OPE Panel and buttons are not operated.
• **Location**	1.OPE ASS'Y 2.Connection between the Main B'D and OPE ASS'Y 3.Main B'D.

Check and Cause	Solution
1. Clear the memory. 2. Check if OPE HARNESS is connected to the Main Board correctly.	1. Try again after clearing the memory. 2. After confirming that OPE HARNESS is connected to the Main Board correctly, if it is so, then replace the OPE ASS'Y and Main Board in sequence.

4-3-4 No Power

• **Description**	While the power S/W is turned on, it does not work at all.
• **Location**	1.Power code 2.Connection between the Main B'D and Power HARNESS 3.Power ASS'Y 4.Main B'D.

Check and Cause	Solution
1. Check if the connection of power code is normal.	1. Try to replace the power code. 2. If all the connections are correct, try to replace the power ASS'Y and the Main B/D in sequence.

4-3-5 Defective LCD Operation

• **Description**	The LCD screen is not turned on or has a strange display.

Check and Cause	Solution
1. Clear the memory. (Refer to page 4-6). 2. Confirm to catch a click sound, while a key on the OPE panel is pressed on.	1. The key is wrong itself or wrongly assembled. 2. Even after the key has been replaced, it is still wrong, try to replace the OPE ASS'Y and the Main B'D in sequence.

4-3-6 Defective Operation of Key Button

• **Description**	The button of the OPE Panel is not operated..
• **Location**	1. OPE ASS'Y 2. Main Board

Check and Cause	Solution
1. Confirm to catch a click sound while the key is pressed on. 2. Check if a specific key is pressed by another equipment.	1. If you cannot catch a click sound, the key is wrong itself or wrongly assembled. 2. Even after the key has been replaced, it is still wrong, try to replace the OPE ASS'Y and the Main B'D in sequence.

4-3-7 Paper Jam

• **Description**	The paper is jammed inside the set and not exited from.
• **Location**	ASF ASS'Y

Check and Cause	Solution
1. Check if the paper is crumpled or preprinted. 2. Check if too many sheets of recording paper are put into ASF (Automatic Sheet Feeder). (Standard : up to 100 sheets). 3. Check if the remaining papers are stuck in the frame base.	1. If the papers jammed or pieces of the paper are stuck inside the set, remove them and then try it again. 2. If the problem still exists, try to replace ASF ASS'Y.

4-3-8 Defective Paper Feed (1)

• **Description**	A recording paper is tilted while feeding.
• **Location**	ASF ASS'Y

Check and Cause	Solution
1. Check if the paper guide of ASF (Automatic Sheet Feeder) is set up properly with the width of recording paper. 2. Check if too many sheets of recording paper are put into ASF (Automatic Sheet Feeder). (Standard: up to 100 sheets). 3. Check if the recording paper is crumpled or preprinted.	1. After all have been checked, the problem still exists, try to replace the ASF ASS'Y.

4-3-9 Defective Paper Feed (2)-Display of NO PAPER

• **Description**	paper does not feed into the printer.
• **Location**	ASF ASS'Y

Check and Cause	Solution
Press ENTER button to check.	Even if the ENTER button is pressed, a recording paper is not drawn into, then try to replace the ASF ASS'Y.

4-3-10 Defective Document Feed

• **Description**	It cannot feed the documents to be scanned.
• **Location**	OPE ASS'Y

Check and Cause	Solution
Check if the paper feeding is normal on the OPE panel. (If some part of the paper is pulled into, it may be drawn automatically.)	1. Replace the contaminated or damaged part. (Refer to 3.5.1) 2. If you cannot confirm the damaged part with the naked eye, try to replace the OPE ASS'Y and the Main B'D in sequence.

4-3-11 Multi-Feeding (1)

• **Description**	Multiple-sheets of recording paper are fed at once.
• **Location**	ASF ASS'Y

Check and Cause	Solution
1. Adjust the paper guide of ASF to the width of paper correctly. 2. Check if the recording paper is preprinted or crumpled. 3. Check if too many sheets of recording paper are put into ASF (Automatic Sheet Feeder). (Standard: up to 100 sheets).	1. Blow several times of puff into the paper in order to prevent static electricity. 2. Even after the papers are loaded correctly, if multiple sheets of paper are still fed at once, then try to replace the ASF ASS'Y.

4-3-12 Defective ADF

• **Description**	ADF (Automatic document Feeder) is not properly operated.
• **Location**	OPE ASS'Y.

Check and Cause	Solution
1. Check if ADF rubber and HOLDER rubber are damaged. 2. Check if the document sensors of OPE ASS'Y (2 paper sensors) are normal.	1. Replace the contaminated or damaged part. (Refer to 3.5.1) 2. If you cannot confirm the damaged part with the naked eye, try to replace the OPE ASS'Y.

4-3-13 Defective Sensing-ink

• **Description**	The ink is put in the set, but it cannot sensed.
• **Location**	1.Main B'D 2.Cartridge ASS'Y

Check and Cause	Solution
1. Check if the cartridge is installed in the cartridge box properly. (It makes a click sound normally when it is normal.)	1. Even after the cartridge is installed normally, it still cannot sense, then try to replace the Main B'D.
2. Check if the cartridge box is operated normally.	2. In case the cartridge box is not moved from side to side, check the Flat Cable connection between the Main PBA & Frame Home Unit, and even after being connected properly, if it is still not improved, then try to replace the cartridge ASS'Y.

4-3-14 Defective Sensing-paper

• **Description**	The recording papers are put in already, but it cannot be sensed.
• **Location**	1.Main B'D 2. LF Motor

Check and Cause	Solution
1. Check if the ENTER key on the OPE panel is pressed.	1. Refer to "Defective Paper Feed". 2. Even if the ENTER key on the OPE panel is pressed, it still cannot sense, then try to replace the Main B'D and LF Motor in sequence. **Notes:** The SF-430 Product has no paper sensor, instead it displays ERROR when it cannot pick up the paper.

4-3-15 Defective Motor Drive (LF)

• **Description**	The motor drive of Line Feeder is not working.
• **Location**	1.LF Motor 2.Main B'D.

Check and Cause	Solution
1. Check if the connector of LF Motor is connected to the Main B'D normally.	1. Try to replace the LF Motor ASS'Y and the Main B'D in sequence.

4-3-16 Defective Motor Drive (CR)

• **Description**	The drive of CR Motor is not working.
• **Location**	1.CR Motor 2.Main B'D.

Check and Cause	Solution
1. Check if the connector of CR Motor is connected to the Main B'D normally.	1. Try to replace the CR Motor ASS'Y, the Main B'D in sequence.

4-3-17 Defective Motor Drive (TX)

• **Description**	The TX Motor is not driven.
• **Location**	1.TX Motor 2.Main B'D.

Check and Cause	Solution
1. Check if the connector of TX Motor is connected to the Main B'D normally.	1. Try to replace the TX Motor ASS'Y and the Main B'D in sequence.

4-3-18 Blank Page Print Out (When Copying)

• **Description**	Blank page is printed out when copying.
• **Location**	1.CIS ASS'Y 2.Main B'D

Check and Cause	Solution
1. Check if the recording papers are inserted reversely.	1. Insert the paper with the copy side to be faced down.
2. Perform the CIS test in the TECH MODE. (Refer to 4-1-2)	2. In case the output waveform is abnormal in the CIS test, replace the CIS ASS'Y, while replace the Main B'D in normal.
	Notes: After replacing CIS, you must perform a CIS shading test.

4-3-19 Blank Page Print Out (When Receiving)

• **Description**	Blank page is printed out when receiving.
• **Location**	1.Ink cartridge 2.Main B'D.

Check and Cause	Solution
1. Check if the sender transmits the document properly. 2. Check if there remains some amount of ink. (Ex: COPY TEST/SELF TEST)	1. Replace the ink cartridge. 2. If it is normal in the Copy Test and in the Self Test, try to replace the Main B'D.

4-3-20 Vertical Black Line (When Copying)

• **Description**	Vertical black lines occur in the printing.
• **Location**	1.CIS ASS'Y 2.Main B'D.

Check and Cause	Solution
1. Check if there are substance materials on CIS. 2. Perform a CIS Test to check if the waveform is normal. (Refer to 4-1-2.) 3. Clean the cartridge nozzle.	1. If there are some stains on the surface of CIS, wipe them off with alcohol (IPA). 2. If the CIS waveform is abnormal, replace the CIS ASS'Y. 3. Clean the nozzle and confirm again. 4. After confirming the CIS waveform and cleaning the nozzle, if the vertical black lines still occur, then try to replace the Main B'D. **Notes:** After replacing the CIS, you must perform a CIS shading test.

4-3-21 Vertical Black Line (When Receiving)

• **Description**	It is normal when copying, but the vertical black lines occur in the printing when receiving.
• **Location**	Main B'D.

Check and Cause	Solution
1. Check if the FAX status of the transmitting side is normal. (Ex. Let the transmitter copy once.) 2. Clean the cartridge nozzle. (Refer to 4-2)	1. Even when the transmitting side is normal and after having finished cleaning, if the same problem still exists, then try to replace the Main B'D.

4-3-22 Contaminated Stains on Paper

• **Description**	Contaminated stains on the copied and received paper occur in the printing.
• **Location**	1.CIS ASS'Y 2.Main B'D.

Check and Cause	Solution
1. Check the status of document. 2. Check the waveform by performing a CIS test. (Refer to 4-1-2)	1. If the CIS waveform is abnormal, try to replace the CIS ASS'Y. 2. In case the CIS waveform is normal but the print quality is bad, try to replace the Main B'D. **Notes :** After replacing the CIS, you must perform a CIS shading test (using clean papers).

4-3-23 Bad Printed Image

• **Description**	The copied and received image is light or bad.
• **Location**	1.CIS ASS'Y

Check and Cause	Solution
1. Check the CIS waveform. (Refer to 4-1-2) 2. Test and check the cartridge arrangement. (Refer to 4-2) 3. Clean the cartridge nozzle. (Refer to 4-2)	1. In case the CIS waveform is good, clean the outlet of cartridge. 2. In case the CIS waveform is abnormal, try to replace the CIS ASS'Y. 3. Even after cleaning the outlet of nozzle, the received data image is still bad, then replace the cartridge. 4. Try to replace the Main B'D. **Notes:** After replacing the CIS, you must perform a CIS shading test (using pure clean papers).

4-3-24 Vertical Lines are printed crookedly

• **Description**	The vertical lines are printed crookedly.
• **Location**	Cartridge

Check and Cause	Solution
1. Test and check the cartridge arrangement. (Refer to 4-2)	1. Perform the cartridge arrangement to set up black/color newly. Repeat it several times until you get the sufficient condition.

4-3-25 Bad Color (Intensity)

• **Description**	The color is different from the original document in the printing.
• **Location**	1.Capacity of Ink Cartridge 2.CIS ASS'Y.

Check and Cause	Solution
1. It may occur when the amount of specific ink in the ink cartridge (color) is deficient. 2. Check the waveform by performing a CIS test. (Refer to 4-1-2)	1. After checking if the capacity of ink cartridge is deficient, try to replace it. 2. After having performed a CIS shading test, if it is not still improved, then try to replace the CIS ASS'Y. **Notes:** After replacing the CIS ASS'Y, you must perform the CIS Test (using clean papers).

4-3-26 No Dial Tone

• **Description**	While on-hook button is pressed, there is no dial tone.
• **Location**	1.LIU B'D 2.OPE ASS'Y 3.Main B'D.

Check and Cause	Solution
1. Check if the telephone line cord is connected to TEL LINE correctly. 2. Check if it makes CLICK sound while OHD key is pressed. 3. Check the connection of HARNESS between the LIU and the Main B'D. 4. Check if the SPEAKER is connected correctly.	1. If the telephone cord is normal but there is no dial tone, then try to replace the LIU B'D. 2. If you cannot hear the OHD CLICK sound, the OPE ASS'Y may be defective. Try to replace the OPE ASS'Y. 3. Check the connection of Speaker, and try to replace it. 4. Lastly, try to replace the Main B'D.

4-3-27 Defective MF DIAL

• **Description**	The MF DIAL is not functioning.
• **Location**	1.LIU B'D 2.OPE ASS'Y 3.Main B'D.

Check and Cause	Solution
1. Check if the telephone line is connected correctly.	1. If you cannot catch the OHD CLICK sound, the OPE ASS'Y may be defective. Try to replace the OPE ASS'Y.
2. Wile the BUTTON KEY is pressed, check to catch a CLICK sound.	2. If you can catch a CLICK sound, after checking the connection of HARNESS between the LIU and the Main PBA, try to replace the HARNESS.
3. Check the connection of HARNESS between the LIU and the Main PBA.	3. The problem still persists, then replace the LIU and the main B'D in sequence.
	Notes: The SF-430 Product supports the MF DIAL type only.

4-3-28 Defective FAX FORWARD/RECEIVE

• **Description**	The FAX FORWARD/RECEIVE is not functioning.
• **Location**	1.LIU B'D 2.Main B'D.

Check and Cause	Solution
1. Check if you can catch a dial tone by pressing OHD.	1. If the MODEM testing is normal and there is no dial tone, then try to replace the LIU B'D.
2. Check if you can catch a RECEIVE tone while MODEM testing in the TECH mode.	2. If the MODEM testing is abnormal, try to replace the Main B'D.

4-3-29 Defective FAX FORWARD

• **Description**	RECEIVE is functioning, but FORWARD is not functioning or the received data are broken.
• **Location**	Telephone line

Check and Cause	Solution
1. Check if there is NOISE when pressing on-hook dial. 2. Check the RECEIVE condition by trying to forward a FAX to another fax machine from the forwarding side FAX. 3. Check if the telephone line connected to the Product is contaminated or gets stripped off or down.	1. If it makes NOISE while on-hooking, replace or repair the telephone line.

4-3-30 Defective FAX RECEIVE (1)

• **Description**	FORWARD is functioning, but RECEIVE is not functioning or the received data are broken.
• **Location**	Telephone line

Check and Cause	Solution
1.Check if there is NOISE when pressing on-hook dial. 2.Check the RECEIVE condition by trying to receive a FAX at another fax machine.	1.If it makes NOISE while on-hooking, replace or repair the telephone line.

4-3-31 Defective FAX RECEIVE (2)

• **Description**	The received data are lengthened or cut in the printing.
• **Location**	Telephone line

Check and Cause	Solution
1. Check if there is NOISE when pressing on-hook dial. 2. Ask to the forwarding side, check the image quality of another machine receiving a FAX additionally sent to.	1. If it makes NOISE, rearrange the telephone line. (Refer to 'Defective FAX RECEIVE'.) 2. Check if the FAX status of the forwarding side is also normal.

4-3-32 Defective FAX RECEIVE (3)

• **Description**	The phone is ringing continuously, but it cannot receive.
• **Location**	1.OPR panel 2.LIU B'D 3.Main B'D.

Check and Cause	Solution
Check if the RECEIVE mode is TEL MODE or FAX MODE.	Even when the RECEIVE mode is changed to FAX MODE, it cannot receive, then replace the LIU and the Main B'D in sequence.

4-3-33 Defective FAX RECEIVE (4)

• **Description**	The received data is reduced by more than 50% in the printing.
• **Location**	Telephone line

Check and Cause	Solution
Check the FAX status of the forwarding side.	After checking the data of the forwarding side, correct the FAX of the forwarding side.

4-3-34 Defective Automatic Receiving

• **Description**	The automatic receiving function is not working.
• **Location**	1.The RECEIVE mode (LCD WINDOW) 2.LIU BOARD 3.Main B'D.

Check and Cause	Solution
1. Check if the RECEIVE mode is TEL MODE or FAX MODE.	1. If the RECEIVE mode is set to the TEL MODE, reset it to the FAX MODE. 2. Even after the RECEIVE mode is changed to the FAX mode, it cannot receive, then try to replace the LIU and the Main B'D in sequence.

4-3-35 The Printer is Not Working (1)

• **Description**	While the power is turned on, the printer is not working at all by the PRINT command from the computer.

Check and Cause	Solution
1. Perform the Printer Self-Test.	1. Check the power source of the printer first and perform the Printer Self-Test. If the test results in printing, it is considered as there is no problem in the printer itself. If the printer is not working, the function may be defective (not due to S/W), so take another proper measure.
2. Check if the PC and the printer cable are properly connected.	2. Check the status of the printer connection, and if it is defective, replace the printer cable (USB or Parallel).
3. Check if the printer driver is correctly installed.	3. Check the connection between PC and printer port (USB port or LPT port). Check if the printer driver at the Printers on the Control Panel is installed. If the printer driver is properly setup, check in which program the printing is not working. The best way is to try printing from the Memo pad, the WINDOWS basic program. Sometimes, the print out is normal within the WINDOWS basic programs, but it may not work in a specific program. In such case, reinstall the printer driver.

4-3-36 The Printer is Not Working (2)

• **Description**	Even after the Print command, there is no response at all or the printing speed is low.

Check and Cause	Solution
It may due to wrong setup of the environment rather than malfunction of the printer itself. And in case that abnormal characters are printed out, also check the environment setup. 1. Secure the hard disk space. 2. Printing error occurs even if there is enough space in the hard disk. 3. Reboot the system, and try printing again.	1. Not working with the message 'Insufficient memory' means that the hard disk space to store the print information is insufficient rather than the RAM insufficiency. In this case, secure more space for the hard disk. Secure more space for C drive by using the Disk utilities program at 'PROGRAM - ACCESSORIES - SYSTEM TOOL' from the Start menu. 2. The connection of the cable or printer port is not properly setup. 3. If characters are printed abnormally, the cable or the printer driver may be defective. Turn the PC and printer off, and reboot the system to try printing again. If the problem still exists, double click to install the printer from My Computer and right-click the mouse, then click 'Test Print' button at the bottom of the file information tab. If normal characters are not printed again, the cable must be defective so replace the cable with a new one.

4-3-37 Abnormal Printing

• **Description**	The printing is not working properly even when the cable has no problem. (even after the cable is replaced) If the printer won't work at all or strange characters are only printed, it may be the printer driver problem.

Check and Cause	Solution
1. Printer driver error 2. Error due to insufficient memory. (The printing job sometimes stops during proceeding or not completed due to insufficient memory.)	1. Check 'My Computer - Printers'. (If the printer driver is installed not compatible with the printer currently installed or an error occurs in the driver file, remove the existing driver and reinstall the printer driver by using the 'Printer Add' menu. 2. This is because of an insufficient virtual memory. (It does not mean the actual capacity of RAM but the space of hard disk.) Delete unnecessary files to secure enough space of the hard disk and try printing again.

Name of Printer Port :

To reinstall the printer driver, do after removing the current driver.

- While installing the driver, Set and PC should be connected.
  (The printer setup may be wrong if they are not connected during installing.)
- The SF-430 Model supports all the USB/Parallel Print, select the USB Port when using the USB, while select the LPT Port when using the Parallel.

4-3-38 Spool Error and Release of Spool Error

• **Description**	pool (Simultaneous Peripheral Operations Online) refers to process the document to be read and stored in the hard disk or the mass storage media, and then to be printed at more convenient time. While the printer is outputting other file, the file requested to output is undergone to be spooled in the hard disk, the spool error may occur if a problem occurs in this process. First, delete the Spool Data if the Spool Error occurs.

Check and Cause	Solution
I. Insufficient space of the hard disk set as the default spool directory.	1. Delete unnecessary files to provide more hard disk space and try printing job.
2. If the previous printing out error is not solved.	2. Since there may be some journal files with the extension ***.jnl, delete them and reboot the WINDOWS to restart printing job.
3. In case a collision with other program is expected.	3. Exit all other programs except the program currently using, if possible, and print again.
4. When an application program or the printer driver file is damaged.	4. Delete the printer driver completely and reinstall it.
5. If some of OS related files are damaged or malfunctioning due to virus infections.	5. After rebooting the computer, check viruses, restore the damaged files and reinstall the program, then try print ing again.
6. The memory is less than that recommended by the OS.	6. Add memory to the PC.

How to delete the data in the spool manager :

In the spool manager, the installed drivers and the list of all the documents waiting to be printed are shown. Select the data of the document to be deleted and select Document menu --> Delete.

If you intend to delete the current document being printed, the data being transferred to the printer will be printed out and then the document will be removed. Before choosing the document data, the document menu is still inactive.

Or Hold the document in the waiting list and repeat the routine as the above or exit the Spool manager

5. Exploded View and Parts List

5-1 Main Ass'y Exploded View and Parts List ..... page(5-2)

5-2 OPE Unit Exploded View and Parts List ..... page(5-4)

5-3 Base Unit Exploded View and Parts List ..... page(5-6)

5-4 Engine Ass'y Exploded View and Parts List ..... page(5-8)

5-5 Handset Diagram Exploded View and Parts List ..... page(5-11)

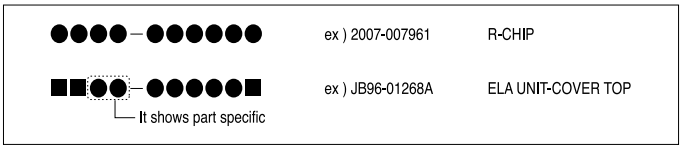
5-6 SMPS Parts Lists ..... page(5-12)

- Deal drawings and service parts are declared for the items with higher rate of inferiority and replaceable in the level of service description only.
- If inferiority occurs, you can replace the parts by the unit declared in deal drawings and service items.

Way to observe Part Code & Description

Part code and Description is quoted and controlled by determined standard. Refer to this determined standard, it will help with ordering Part.

- **There are two kinds of Part code inscription type.**



(● : figure, ■ : character (alphabet))

Type 1 : Controlled by Company : It can be commonly used for all kinds of product SEC produce. Mostly, electronics Parts.

Type 2 : Controlled by Division : It is used or one produce. Mostly, Mostly, mechanical Parts.

- **A/S privately used part :** It is only used for A/S .
- **Ass'y part :** Assembled by more than 2 Parts. If necessary part is not A/S Part, Ass'y part including necessary par can be used. It is shown in the diagram and drawing of SVC manual.

- Ass'y part and A/S privately used Part is distinguished by part Code and Description. The are inscription type 2. It is recognized by Part character and front side of description.

DIVISION	PART CODE	DESCRIPTION
A/S Private	**81-****** (JB81-00039A)	AS-***** (AS-USE)
ASS'Y Part	**75-****** (JB75-00068A)	MEC-***** (MEC-CHUTE)
ASS'Y Part	**92-****** (JB92-01131A)	PBA ****** (PBA MAIN-CONTROLLER)
ASS'Y Part	**97-****** (JB97-01089A)	MEA ****** (MEA UNIT-PULLEY IDLE)

Appendix information

The following list shows different materials by model.
The material codes mentioned in the manual are subject to change without prior notice.
For the latest exact information, see ITSELF System. (**http://itself.sec.samsung.co.kr**)

SF-430/XEC

DESCRIPTION	SEC.CODE
ELA UNIT-OPE	JB96-01302C
SHEET-LCD	JB63-00017C
PBA USB-LIU	JB92-01191D
ELA HOU-OPE COVER	JB96-01292E

SF-430/XEU

DESCRIPTION	SEC.CODE
ELA UNIT-OPE	JB96-01302A
SHEET-LCD	JB63-00017A
PBA USB-LIU	JB92-01191B
ELA HOU-OPE COVER	JB96-01292A

SF-430/XEF

DESCRIPTION	SEC.CODE
ELA UNIT-OPE	JB96-01302F
SHEET-LCD	JB63-00017G
PBA USB-LIU	JB92-01191E
ELA HOU-OPE COVER	JB96-01292C

SF-430/XFA

DESCRIPTION	SEC.CODE
ELA UNIT-OPE	JB96-01302A
SHEET-LCD	JB63-00017A
PBA USB-LIU	JB92-01191G
ELA HOU-OPE COVER	JB96-01292A

SF-430/XEG

DESCRIPTION	SEC.CODE
ELA UNIT-OPE	JB96-01302B
SHEET-LCD	JB63-00017B
PBA USB-LIU	JB92-01191D
ELA HOU-OPE COVER	JB96-01292B

SF-430/XIL

DESCRIPTION	SEC.CODE
ELA UNIT-OPE	JB96-01302D
SHEET-LCD	JB63-00017D
PBA USB-LIU	JB92-01191F
ELA HOU-OPE COVER	JB96-01292G

SF-430/XEP

DESCRIPTION	SEC.CODE
ELA UNIT-OPE	JB96-01302E
SHEET-LCD	JB63-00017F
PBA USB-LIU	JB92-01191D
ELA HOU-OPE COVER	JB96-01292F

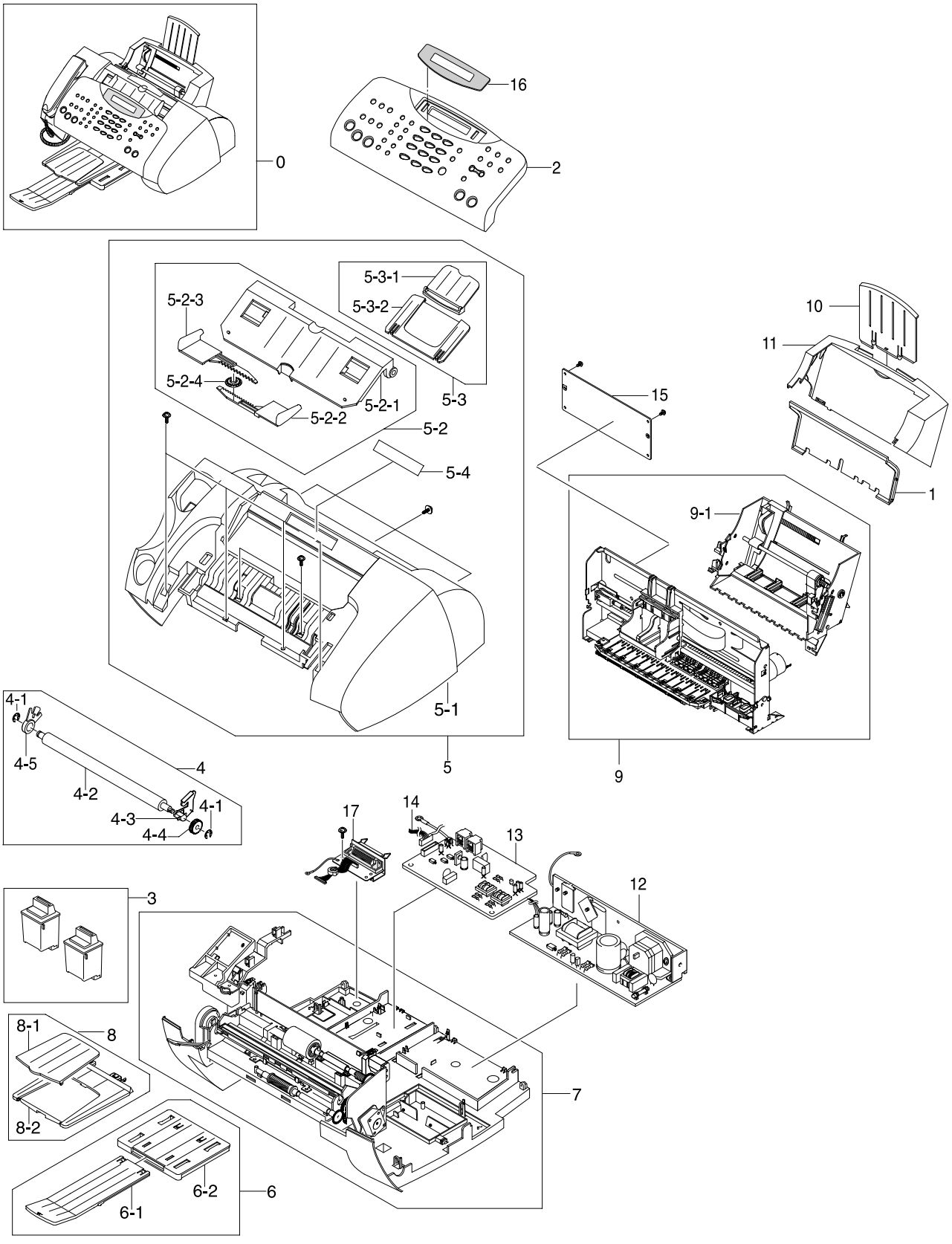
SF-430/XSH

DESCRIPTION	SEC.CODE
ELA UNIT-OPE	JB96-01302A
SHEET-LCD	JB63-00017A
PBA USB-LIU	JB92-01191F
ELA HOU-OPE COVER	JB96-01292A

SF-430/XET

DESCRIPTION	SEC.CODE
ELA UNIT-OPE	JB96-01302G
SHEET-LCD	JB63-00017A
PBA USB-LIU	JB92-01191D
ELA HOU-OPE COVER	JB96-01292D

5-1 Main Ass'y Exploded view



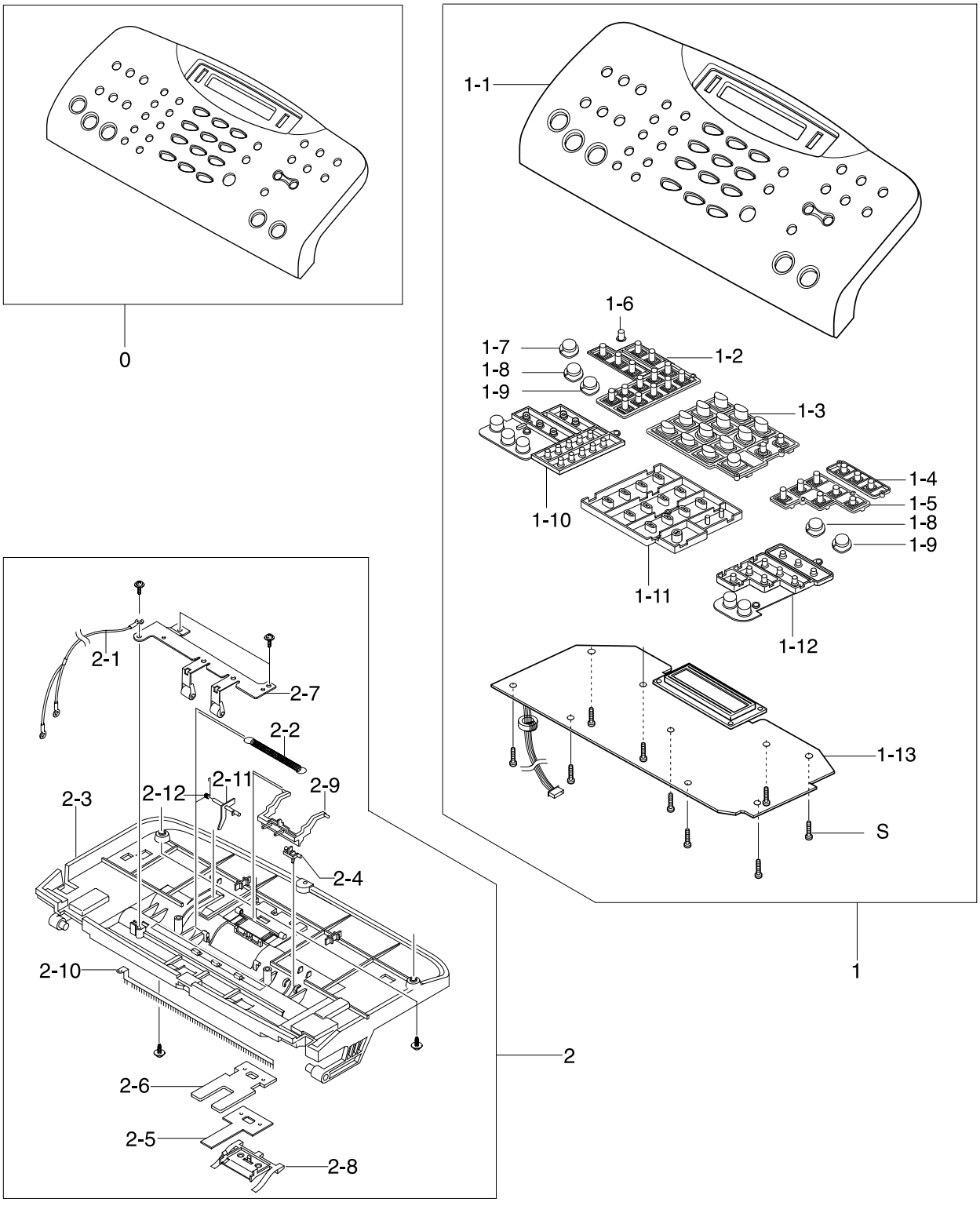
< Main Ass'y Parts List >

SA. : Service Available

NO	DESCRIPTION	SEC CODE	Q'TY	SA	REMARK
0	SF-430				
1	PMO-COVER PCB	JB72-00302A	1	O	
2	ELA UNIT-OPE	Refer to the table	1	O	
3	PRINT HEAD INK-CPQ M (SET)	*	1	X	
	PRINT HEAD INK-CPQ C (SET)	*	1	X	
4	MEC-WHITE ROLLER	JB75-00367A	1	O	
4-1	RING-C	*	2	X	
4-2	MEC-ROLLER CIS	*	1	X	
4-3	PMO-BUSHING WHITE	*	1	X	
4-4	PMO-GEAR DRIVER	*	1	X	
4-5	PMO-BUSHING WHITE	*	1	X	
5	MEC-COVER TOP/SEC	JB75-00365A	1	O	
5-1	COVER TOP	JB63-00011A	1	O	
5-2	MEC-DOOR ASS'Y	JB75-00112A	1	O	
5-2-1	PMO-DOOR	*	1	X	
5-2-2	PMO-GUIDE DOC R	*	1	X	
5-2-3	PMO-GUIDE DOC L	*	1	X	
5-2-4	GEAR-PINION	*	1	X	
5-3	MEC-CHUTE	JB75-00113A	1	O	
5-3-1	PMO-DUMMY CHUTE	*	1	X	
5-3-2	PMO-CHUTE	*	1	X	
5-4	LABEL(P)-REPLACE	*	1	X	
6	MEC-STACKER RX	JB75-00117A	1	O	
6-1	PMO-STACKER RX1	*	1	X	
6-2	PMO-STACKER RX2	*	1	X	
7	ELA UNIT-COVER BASE	JB96-01289A	1	O	
8	MEC-STACKER TX	JB75-11152C	1	O	
8-1	PMO-STACKER TX1	*	1	X	
8-2	PMO-STACKER TX2	*	1	X	
9	ELA UNIT-ENGINE ASS'Y,SEC	JB96-01293A	1	O	
9-1	MEC-FEEDER	JB75-00377A	1	O	
10	PMO-GUIDE EXTENSION	JB72-00304A	1	O	
11	PMO-DUMMY ASF	JB72-00300A	1	O	
12	SMPS-MAGIC	JB44-00017A	1	O	
13	PBA SUB-LIU	Refer to the table	1	O	
14	CBF HARNESS-LIU	JB39-00122A	1	O	
15	PBA MAIN-MAIN	JB92-01188B	1	O	
16	SHEET-LCD	Refer to the table	1	O	
17	ELA UNIT-CENTRONICS	JB96-01325A	1	O	

O: Service available X: Service not available

5-2 OPE Unit Exploded view



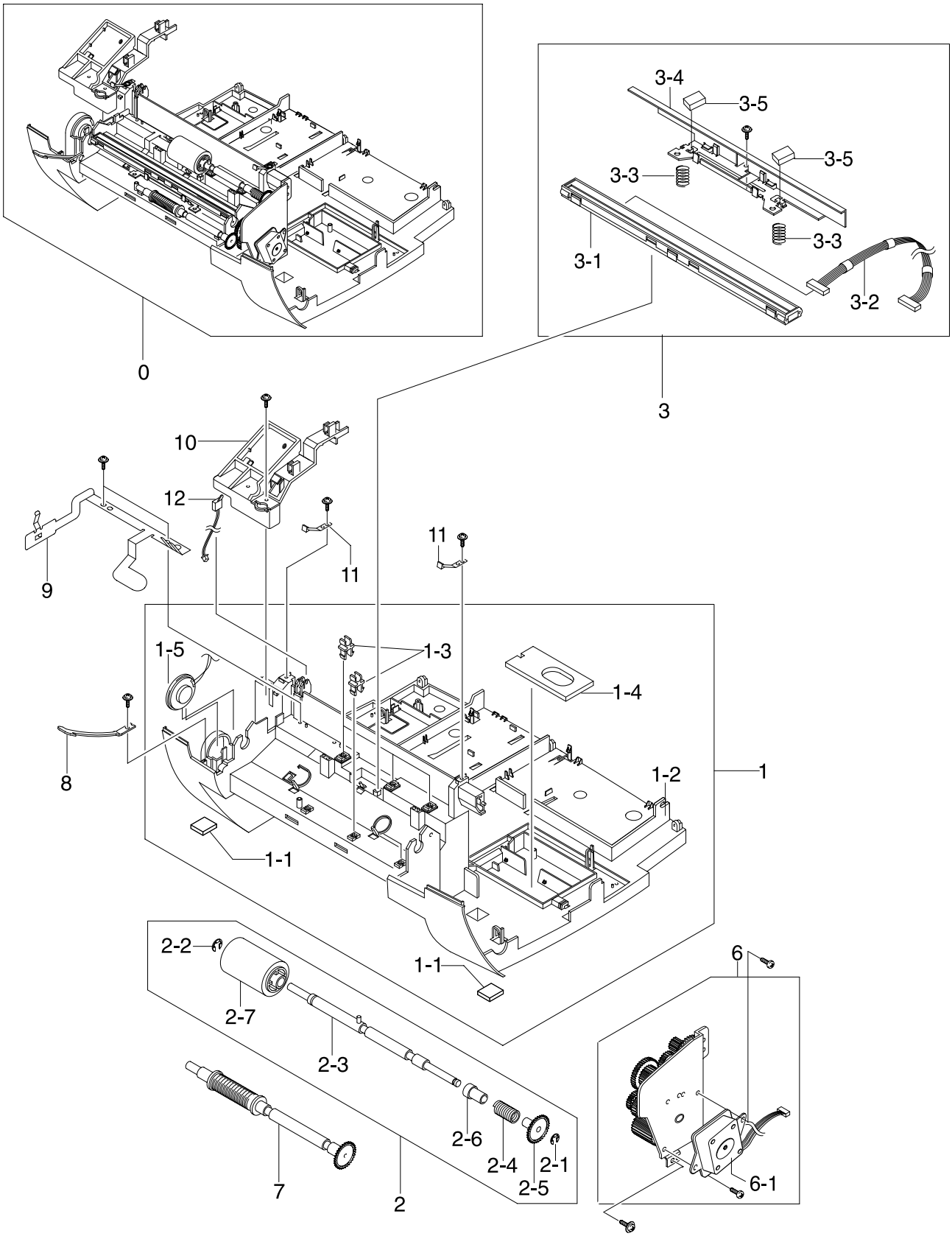
< OPE Unit Parts List >

SA. : Service Available

NO	DESCRIPTION	SEC CODE	Q'TY	SA	REMARK
0	ELA UNIT-OPE	Refer to the table	1	O	
1	ELA HOU-OPE COVER	JB96-01292A	1	O	
1-1	COVER-M-OPE/SAMSUNG	*	1	X	
1-2	KEY-M-FUNCTION	*	1	X	
1-3	PMO-KEY TEL	*	1	X	
1-4	KEY-M-MENU	*	1	X	
1-5	PMO-KEY FUNCTION	*	1	X	
1-6	PMO-KEY ANSWER	*	1	X	
1-7	PMO-KEY SCAN	*	1	X	
1-8	PMO-KEY BLACK	*	2	X	
1-9	PMO-KEY COLOR	*	2	X	
1-10	RMO-RUBBER CONTACT FUNCT	*	1	X	
1-11	RMO-RUBBER CONTACT TEL/S	*	1	X	
1-12	RMO-RUBBER CONTACT START	*	1	X	
1-13	PBA SUB-OPE_SEC	*	1	X	
2	ELA HOU-SCAN UPPER	JB96-01290A	1	O	
2-1	CBF HARNESS-SCAN FG	*	1	X	
2-2	SPRING-ADF	*	1	X	
2- 3	FRAME-M-UPPER	*	1	X	
2- 4	PMO-LEVER ACTUATOR	*	1	X	
2- 5	PPR-SHEET ADF	*	1	X	
2-6	RPR-RUBBER ADF	JG73-10003A	1	O	
2-7	MEC-PINCH	*	1	X	
2-8	PMO-HOLDER RUBBER	*	1	X	
2-9	SUPPORT-M-ADF	*	1	X	
2-10	MEC-BRUSH ANTISTATIC	*	1	X	
2-11	LEVER-M-SENSOR	JB66-00144A	1	O	
2-12	SPRING-LEVER SENSOR	JB61-00107A	1	O	
S3	SCREW-TAPPING	*	9	X	

O: Service available X: Service not available

5-3 Base Unit Exploded view



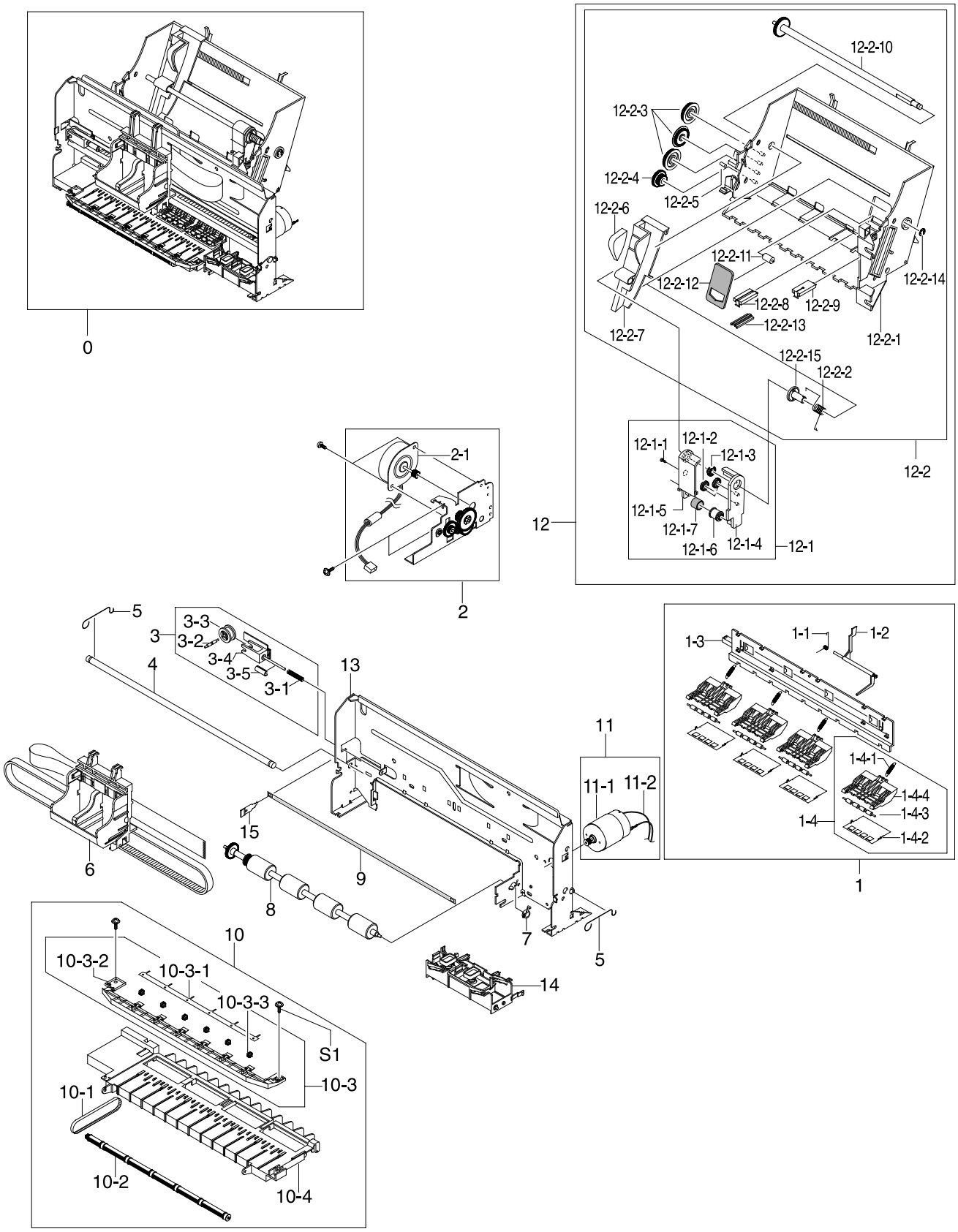
< Base Unit Parts List >

SA. : Service Available

NO	DESCRIPTION	SEC CODE	Q'TY	SA	REMARK
0	ELA UNIT-COVER BASE	JB96-01289A	1	O	
1	MEC-COVER BASE	JB75-00362A	1	O	
1-1	FOOT-RUBBER	*	2	X	
1-2	COVER-M-BASE	*	1	X	
1-3	PMO-BUSHING TX(B4)	*	6	X	
1-4	MPR-FELT INK	*	1	X	
1-5	ELA M/MEDIO AUD-SPEAKER ASS'Y	*	1	X	
2	MEC-ADF ROLLER	JB75-00120A	1	O	
2-1	RING-C	*	1	X	
2-2	RING-C	*	1	X	
2-3	ICT-SHAFT ADF	*	1	X	
2-4	ICT-SPRING CLUTCH	*	1	X	
2-5	PMO-GEAR ADF	*	1	X	
2-6	PMO-BUSHING HOLDER	*	1	X	
2-7	MEC-ROLLER ADF	*	1	X	
3	ELA UNIT-CIS	JB96-01298A	1	O	
3-1	CONTACT IMAGE SENSOR	0609-001158	1	O	
3-2	CBF-HARNESS CIS	JB39-00118A	1	O	
3-3	SPRING-CIS	*	2	X	
3-4	IPR-BRACKT CIS(D)	*	1	X	
3-5	RPR-PAD CIS	*	2	X	
6	ELA UNIT-SCAN MOTOR	JB96-01300A	1	O	
6-1	MOTOR-STEP TX	JB31-00018B	1	O	
7	PMO-SHAFT EXIT	JG72-40042A	1	O	
8	PMO-TIE STOPPER	JG72-40717A	1	O	
9	IPR-SPRING GND	JB70-00055A	1	O	
10	GUIDE-M-SUPPORT	*	1	X	
11	IPR-LOKER TX	JB70-10958A	2	O	
12	ELA M/M-COVER SENSOR	*	1	X	

O: Service available X: Service not available

5-4 Engine Ass'y Exploded view



< Engine Ass'y Parts List >

SA. : Service Available

NO	DESCRIPTION	SEC CODE	Q'TY	SA	REMARK
0	ELA UNIT-ENGINE ASS'Y/SEC	JB96-01293A	1	O	
1	MEC-HOLDER ROLLER	JB75-11111A	1	O	
1-1	SPRING-ES ACTUATOR	JB61-70919A	1	O	
1-2	PMO-ACTUATOR FEED	JB72-40993A	1	O	
1-3	PMO-HOLDER ROLLER SUB	*	1	X	
1-4	MEC-FRIC ROLLER	*	4	X	
1-4-1	SPRING-ES FRICTION	*	1	X	
1-4-2	IPR-DEFLECTOR	*	1	X	
1-4-3	ICT-FRICTION ROLLER	*	1	X	
1-4-4	PMO-HOLDER F/R	*	1	X	
2	MEA UNIT-BRKT LF	JB97-00988A	1	O	
2-1	MOTOR-STEP LF(V)	JB31-00007A	1	O	
3	MEC-PULLEY IDLE	JB75-11110A	1	O	
3-1	SPRING-CS PULLEY	*	1	X	
3-2	ICT-SHAFT PULLEY IDLE	*	1	X	
3-3	PMO-PULLEY IDLER	*	1	X	
3-4	PMO-HOLDER PULLEY	*	1	X	
3-5	PMO-STOPPER PULLEY	*	1	X	
4	ICT-SHAFT CR	JB70-40906A	1	O	
5	SPRING-SHAFT CR	JB61-70913A	2	O	
6	ELA UNIT-CR/SEC	JB96-01303A	1	O	
7	BEARING-FEED R	JB66-10002A	1	O	
8	MEC-ROLLER FEED	JB75-11112A	1	O	
9	PRP-ENCODER STRIP(V)	JB72-00662A	1	O	
10	MEC-FRAME BASE	JB75-00170A	1	O	
10-1	BELT-EXIT	*	1	X	
10-2	MEC-EXIT ROLLER	*	1	X	
10-3	MEC-HOLDER EXIT	*	1	X	
10-3-1	IPR-SPRING WHEEL	*	1	X	
10-3-2	PMO-HOLDER WHEEL	*	1	X	
10-3-3	MEA UNIT-WHEEL STAR	*	6	X	
10-4	MEC-SUB FRAME BASE	*	1	X	
11	ELA UNIT-C/R MOTOR	JB96-01193A	1	O	
11-1	MOTOR-DC CARRIAGE	JB31-00005A	1	O	
11-2	CBF HARNESS-DC MOTOR	JB39-00094A	1	O	

O: Service available X: Service not available

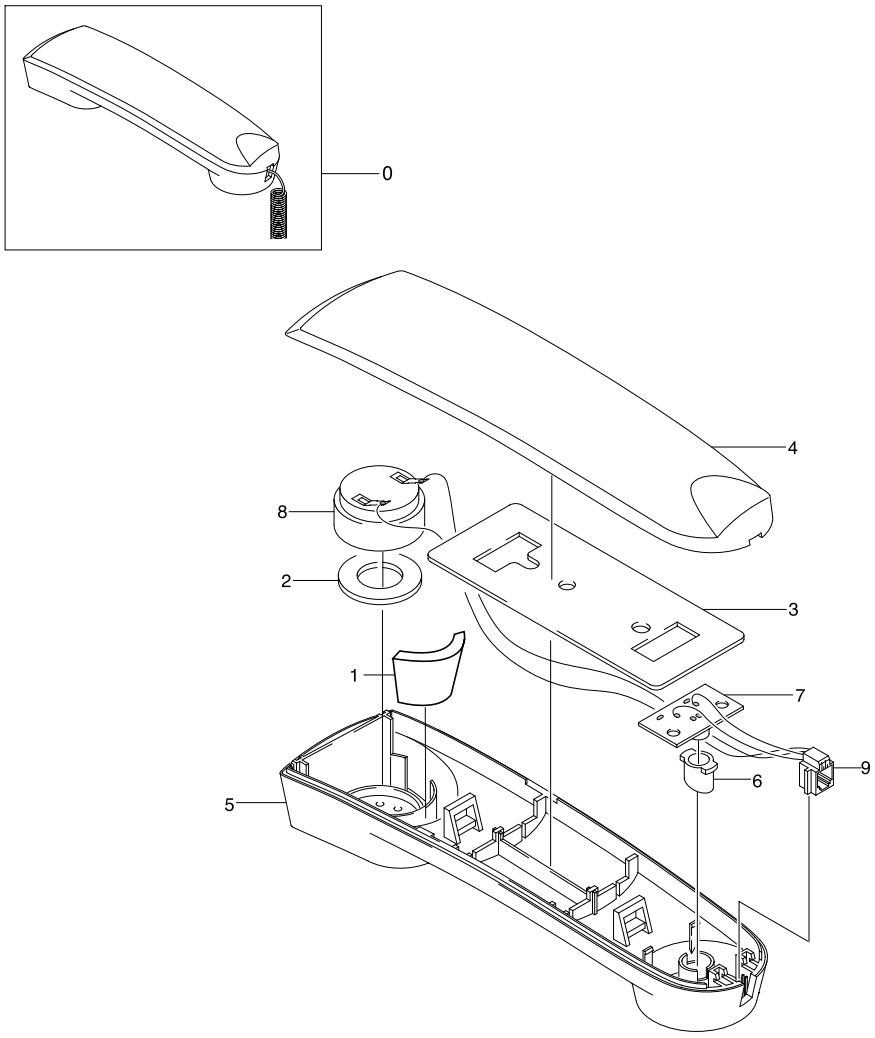
< Engine Ass'y Parts List (cont.) >

SA. : Service Available

NO	DESCRIPTION	SEC CODE	Q'TY	SA	REMARK
12	MEC-FEEDER	JB75-00377A	1	O	
12-1	MEA UNIT-PICKUP ROLL	*	1	X	
12-1-1	SCREW-TAPPING	*	1	X	
12-1-2	GEAR-PICKUP IDLER	*	2	X	
12-1-3	GEAR-DRIVE PICKUP	*	1	X	
12-1-4	PMO-HOUSING R	*	1	X	
12-1-5	PMO-HOUSING L	*	1	X	
12-1-6	PMO-PICKUP ROLL	*	1	X	
12-1-7	RMO-PICKUP RUBBER	*	1	X	
12-2	MEA HOU-ASF W/O PICKUP	*	1	X	
12-2-1	FRAME-M_ASF	*	1	X	
12-2-2	SPRING-TORSION AC	*	1	X	
12-2-3	GEAR-IDLER ASF	*	3	X	
12-2-4	GEAR-DRIVER ASF	*	1	X	
12-2-5	ICT-PIN ASF BOSS	*	1	X	
12-2-6	PMO-CAP LEFT EDGE	*	1	X	
12-2-7	PMO-GUIDE SIDE PAPER	*	1	X	
12-2-8	PMO-HOUSING BUCKLER	*	1	X	
12-2-9	PMO-BUCKLER JAG	*	1	X	
12-2-10	PMO-SHAFT PICKUP	*	1	X	
12-2-11	PMO-ROLLER IDLER	*	1	X	
12-2-12	MPR-PAD FRICTION	*	1	X	
12-2-13	RMO-BUCKLER FRICTION	*	1	X	
12-2-14	RING-E	*	1	X	
12-2-15	PMO-PAPER CAPACITY	*	1	X	
13	MEC-FRAME MAIN	JB75-00349A	1	O	
14	MEC-FRAME HOME	JB75-00174A	1	O	
15	SPRING-PS ENCODER	JB61-70917A	1	O	

O: Service available X: Service not available

5-5 Handset Diagram Exploded View and Parts List



SA. : Service Available

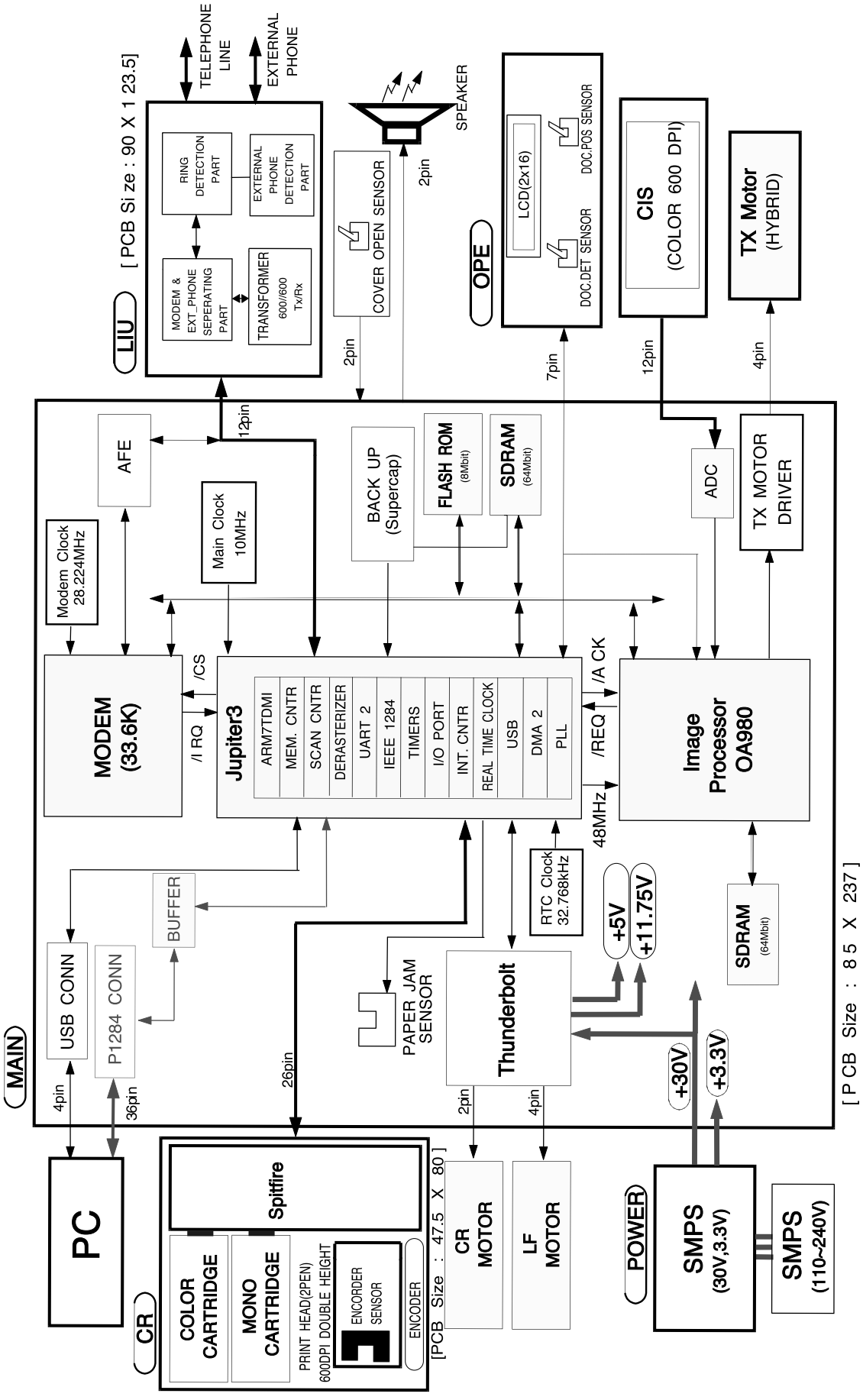
NO	DESCRIPTION	SEC CODE	Q'TY	SA	REMARK
0	ELA HOU-HANDSET	JB96-01043B	1	O	
1	IPR-WEIGHT BALANCE	*	1	X	
2	RING-OPE	6044-000138	1	O	
3	IPR-WEIGHT BALANCE	*	1	X	
4	PMO-HANDSET UPPER	*	1	X	
5	PMO-HANDSET LOWER	*	1	X	
6	RMO-RUBBER MIC	*	1	X	
7	PBA SUB ETC-MIC	*	1	X	
8	AUDIO-RECEIVER	3009-001028	1	O	
9	CBF HARNESS-JACK	*	1	X	

O: Service available X: Service not available

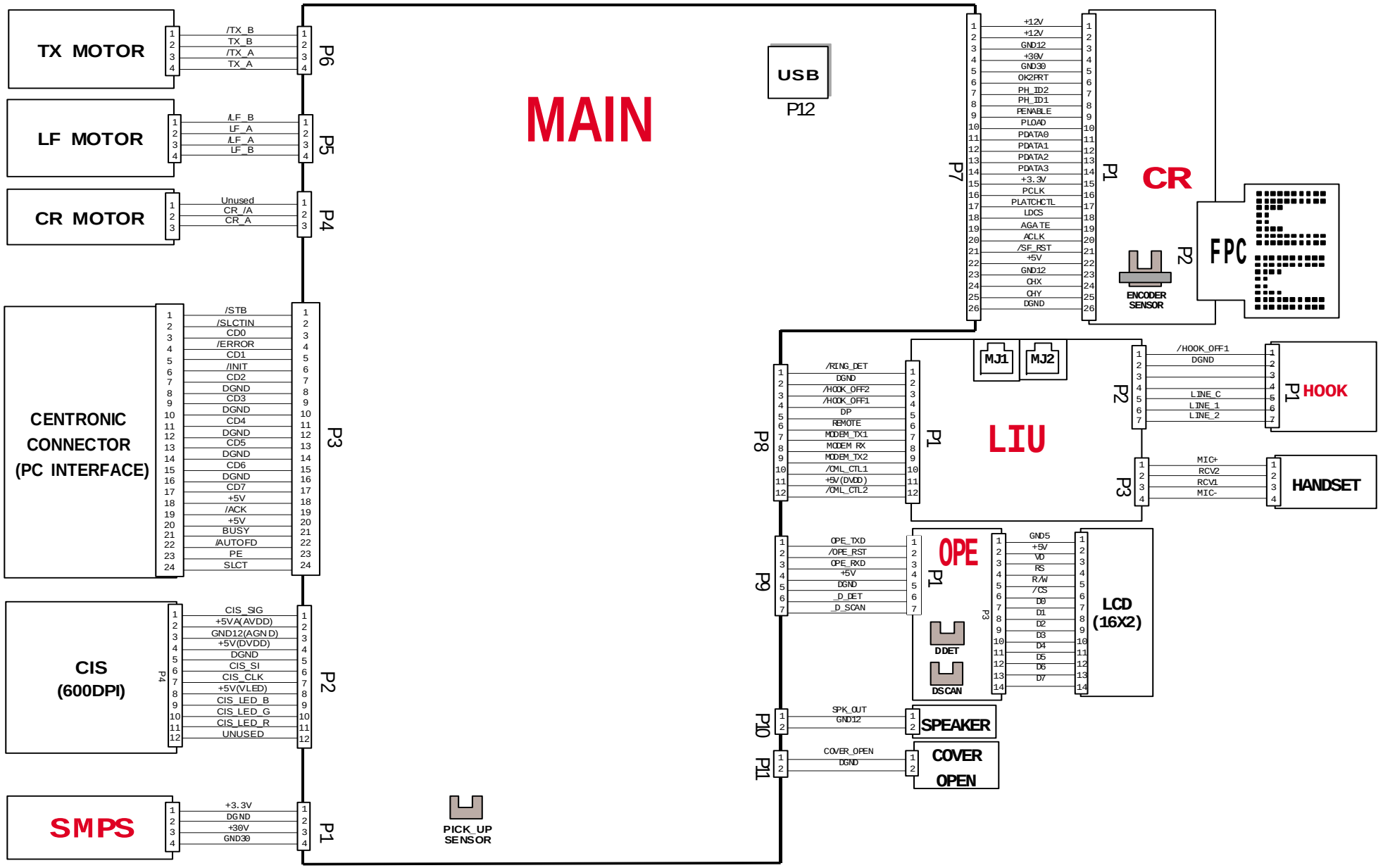
5-6 SMPS Parts Lists

DESCRIPTION	SEC. CODE	Q'TY	SPECIFICATION	LOCATION NO.
TR-SMALL SIGNAL	0501-000010	2	"KSC1008,NPN,800mW,TO-92,TP,120-240"	"Q3,Q4"
AS-FET	JB81-00229A	1	"SCX-1100,FQU2N60,600V, 2A ,-,-,-,-,-"	Q2
AS-DIODE_SCHOTTKY	JB81-00231A	1	"SCX-1100,SR204,40V, 2A,-,-,-,-,-"	D4
AS-DIODE_FR	JB81-00232A	1	"SCX-1100,ER502,200V, 5A,-,-,-,-,-"	D5
AS-DIODE_ZENER	JB81-00233A	1	"SCX-1100,MTZ9.1B,500MW (8.57V~9.01V),-,-,-,-,-"	ZD1
AS-DIODE_ZENER	JB81-00234A	1	"SCX-1100,1N4753A,1W 36V,-,-,-,-,-"	ZD4
AS-DIODE_BRIDGE	JB81-00235A	1	"SCX-1100,2KBP06M,600V, 2A,-,-,-,-,-"	BD1
AS-TRANSFORMER	JB81-00237A	1	"SCX-1100,MAGIC-V3,EE2525W ; MAGIC-V3,-,-,-,-,-"	T1
AS-FUSE	JB81-00239A	1	"SCX-1100,50T,250V 2.0A,-,-,-,-,-"	F1
AS-FET CHIP SILICON	JC81-00020A	1	"ML-7000,IRF9540(N),TO-220,-100V,-17A,0.2OHM,-,-"	FOR_Q1
REACTOR-INR 10D-561K	JC81-00407A	1	"SF-5100,INR 10D-561K,VARISTOR,-,-,-,-,-"	TNR1
AS-R WIRE WOUND	JC81-11404A	2	"SF6000,RWN1W 0.42J,-,-,-,-,-"	"R17,R4"
AS-Q1	JF81-10908A	1	"ALPS-V2,SSP5N80A,800V,5A,-,-,-"	Q1

6. Block Diagram



7. Connection Diagram



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6. Block Diagram

7. Connection Diagram

Repair Manual

SAMSUNG FACSIMILE

SF-430

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3. Circuit Description
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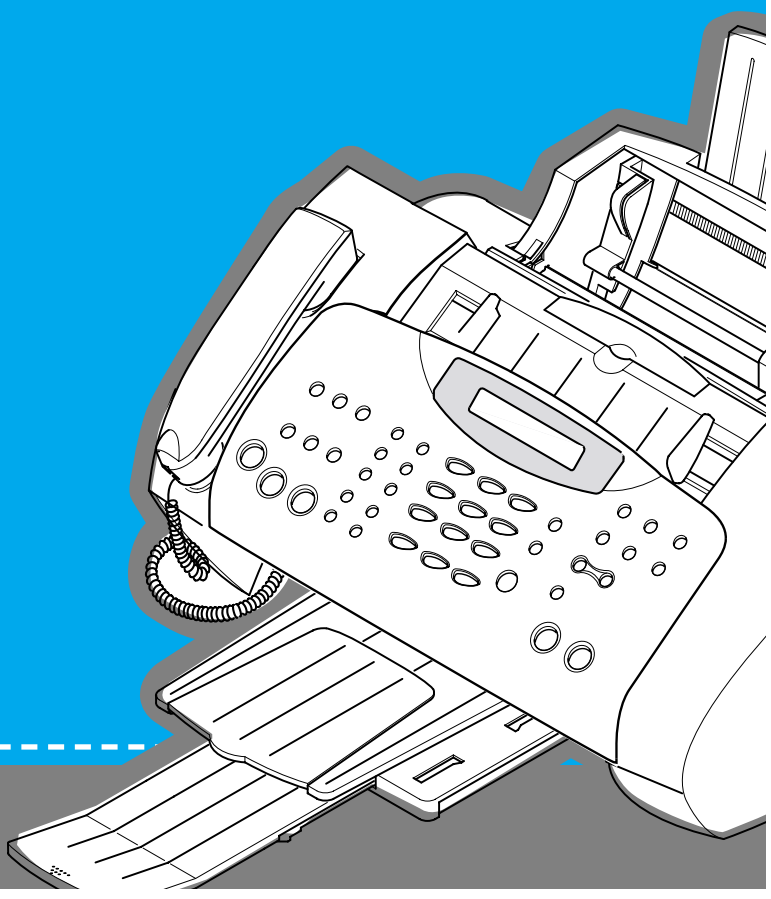
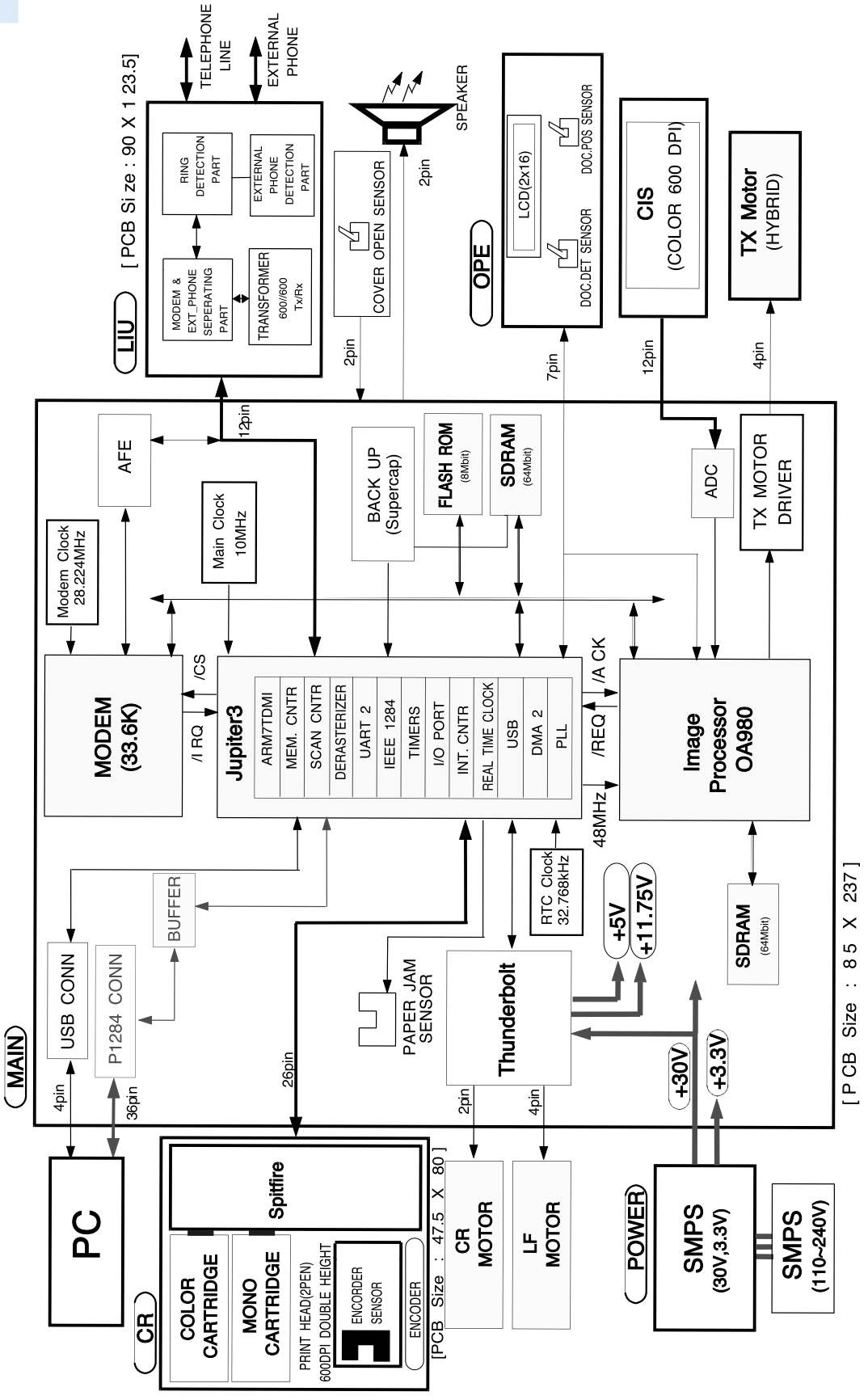


1. Block Diagram



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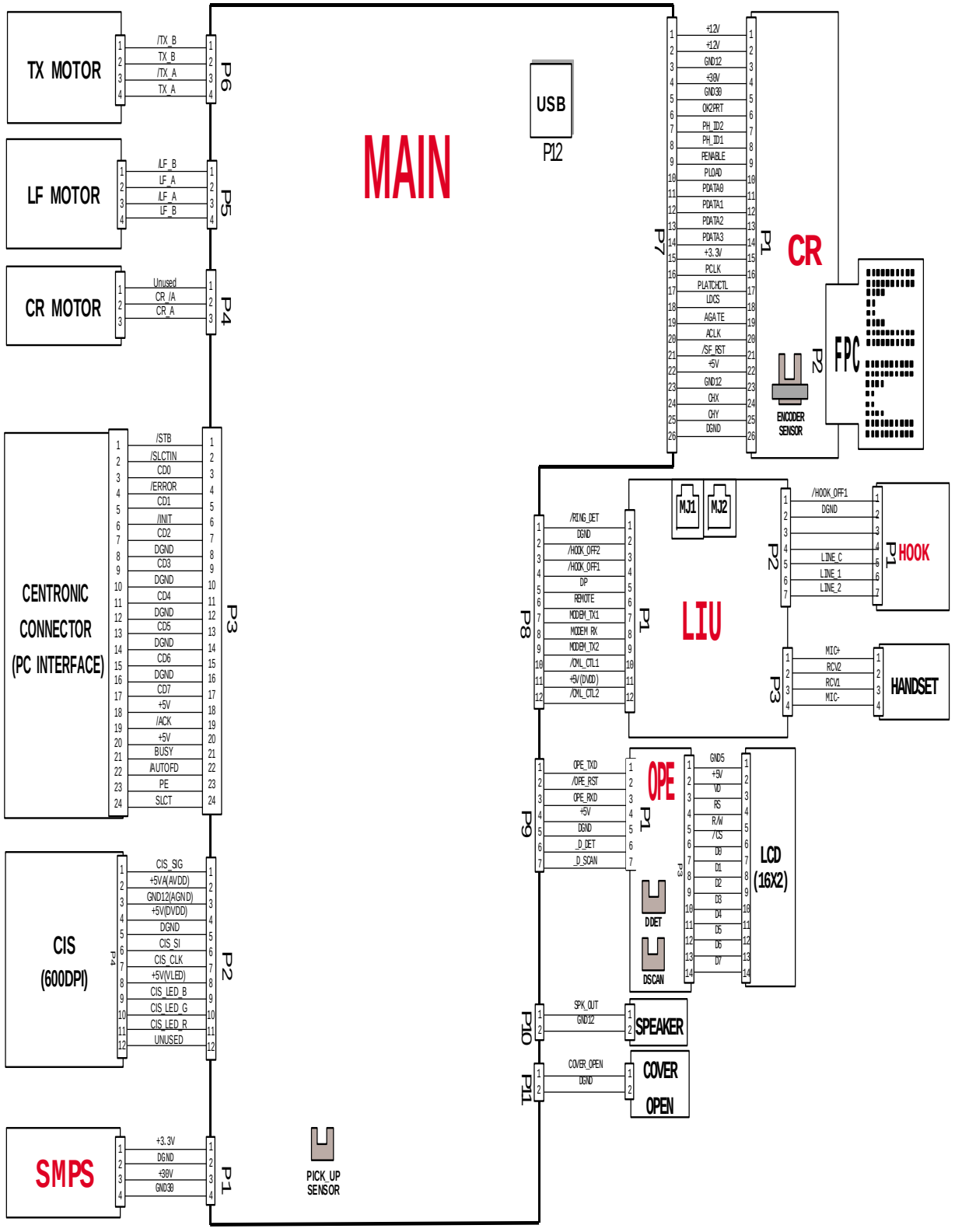
2. Connection Diagram



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3. Circuit Description

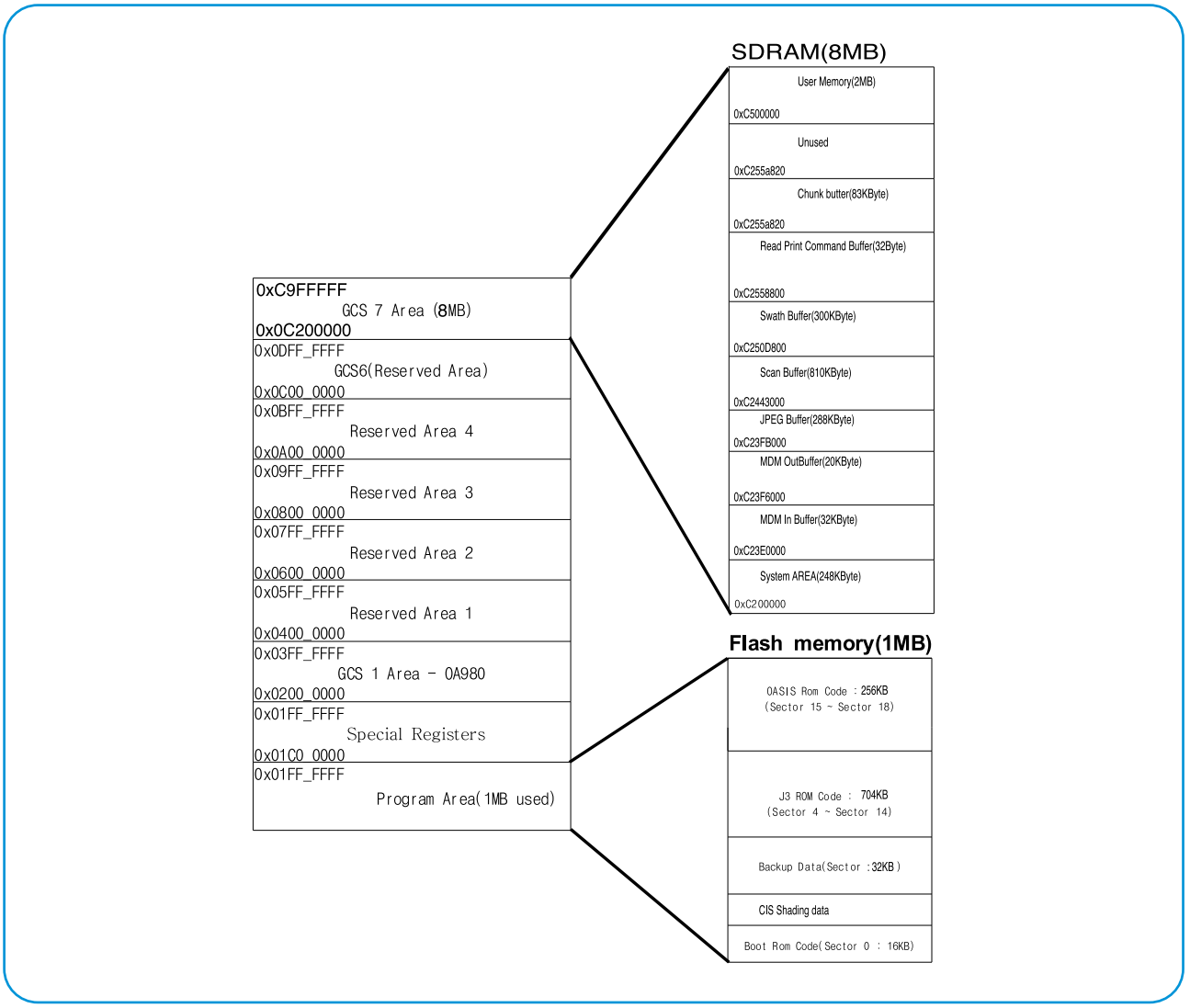
• Main B'D

3-1. GENERAL DESCRIPTION

Main circuit consists of mainly consists of CPU and the controller part with various types of built-in I/O device driver(built-in RISC Processor Core: ARM7TDMI), system memory part, OA980 controlling input of image received from conversion. The following nomenclatures by section is the same as those listed in the circuit diagram.

3-2. MEMORY MAP

The entire Addressing area provided by MAIN CONTROLLER(S3C46MOX(Jupiter3)) is 256MBytes from 0x00000000 to 0x10000000, and the Max. Address Range for each External Chip Select is 32M Byte or Half word from 0x000000 to 0x01FFFFFF and embodied with Big-Endian Bus interface. MEMORY area is divided into EXTERNAL ROM and RAM areas(See (Figure 1)), and the areas actually used are 8M BYTES SDRAM and 1M BYTES ROM(FLASH MEMORY). In case of SDRAM, it uses 0xC200000h ~ 0xC9FFFFFh, and ROM uses 0x0000000h ~ 0x0FFFFFFh area.



<Figure 1. S3C46MOX(Jupiter3) MEMORY MAP>

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3-3.DETAILED DESCRIPTION

3-3-1 BLOCK DIAGRAM and MAIN CONTROLLER description

3-3-1-1 General description

MAIN CONTROLLER(S3C46MOX(Jupiter3),U21) consists of this system consists of CPU(ARM7TDMI RISC PROCESSOR), 8K BYTES CACHE, DATA and ADDRESS BUS, PLL deriding input frequency and CLOCK CONTROL part, SERIAL COMMUNICATION part supporting UART, PRINT HEAD control part, PARALLEL PORT INTERFACE part, USB INTERFACE part, External DMA part for receiving data from external COLOR IMAGE PROCESSOR(OA-980,U13), MEMORY and EXTERNAL BANK control part, SYNCHRONOUS SERIAL INTERFACE control part for interfacing Thunderbolt, and LF/CR Motor drive control and general purpose I/O control parts.(See Figure 2)

3-3-2 S3C46MOX(Jupiter3) FUNCTION DESCRIPTION

3-3-2-1 SYSTEM CLOCK

There are two ways of Clock input method. One is the method to make Master Clock(MCLK) at the internal PLL by connecting X-tal and Capacitor to the outside, and another method is to use MCLK(When inputting 40MHz) directly, which supplies maximum 40MHz Clock to the EXTCLK terminal(PIN65). The range of frequency being input in case of using X-tal is limited to 4MHz~10MHz. This system uses SSCG(FS781) with a 10MHZ X-tal outside to make MCLK, and supplies Clock to the XIN terminal(PIN67) of ASIC by expanding Spectrum with bandwidth about 1.5% in comparison with the basic frequency by using this IC. Inside the ASIC, the PLL makes 66MHz MCLK signal, which is the basic operation frequency of the System. Also, this PLL makes 48MHz, the operation frequency of USB Controller.

3-3-2-2 DATA and ADDRESS BUS CONTROL

1. /RD & /WR

/RD & /WR SIGNAL are synchronized with the inside MCLK(66MHZ) and becomes active to Low.
These signal are Strobe Signal used to Read or Write data when each Chip Select becomes active connected to /RD,/WR PIN of RAM, ROM, OA-980 and MODEM.

2. CHIP SELECT (/ROMCS, /IP_CS,/MODEM_CS,/SCS0)

- /ROMCS : FLASH MEMORY(U27) CHIP SELECT (LOW ACTIVE)
- /IP_CS : OA-980(U13) CHIP SELECT (LOW ACTIVE)
- /MODEM_CS : FM336(U17) CHIP SELECT (LOW ACTIVE)
- /SCSO : SDRAM(U25) CHIP SELECT (LOW ACTIVE)

In case each Chip Select is low, it may Read or Write data.

3. D0 ~ D15

- 16BIT DATA BUS

4. A0 ~ A24

- ADDRESS BUS (A23 ~ A24 RESERVED)

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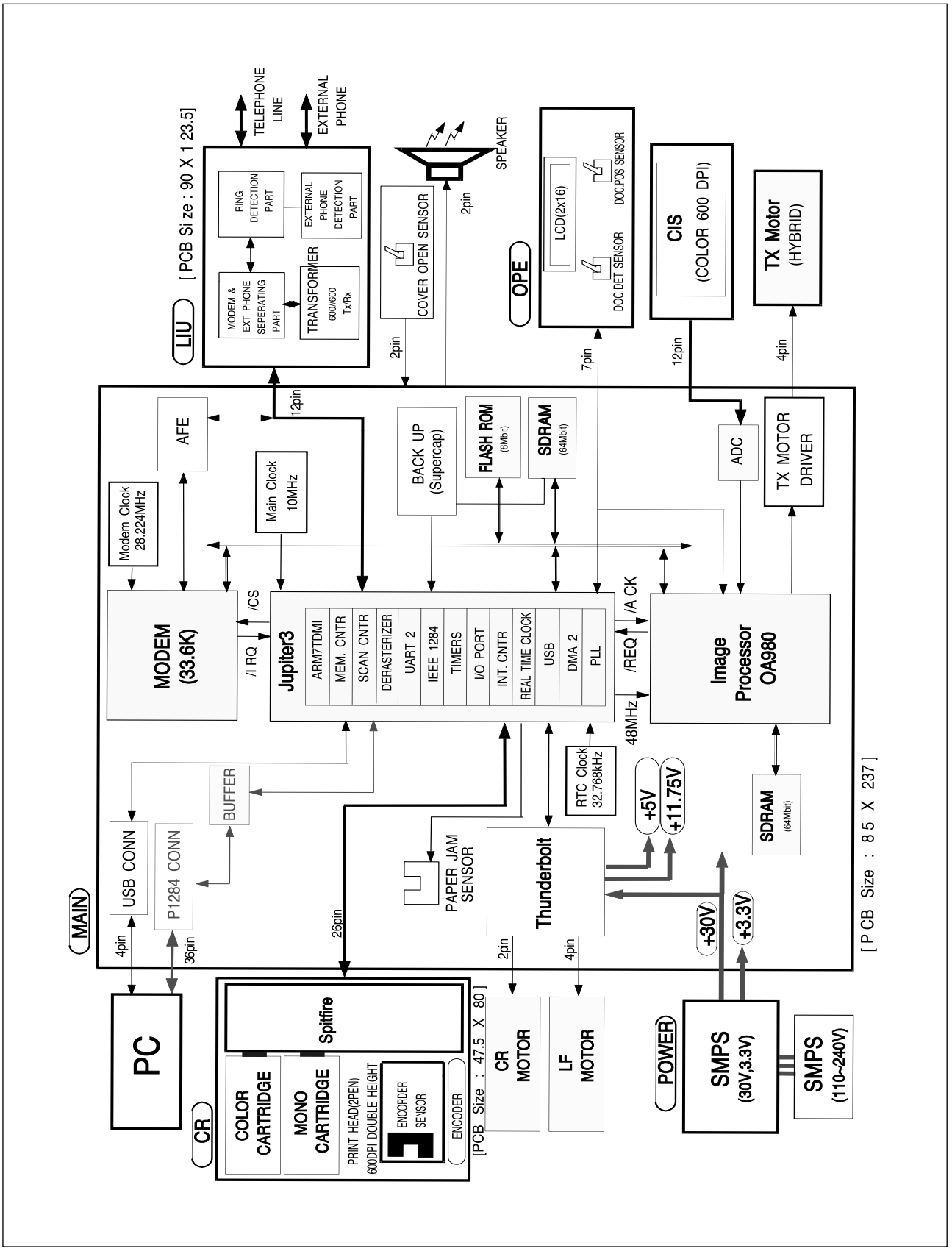

<Figure 2. Block Diagram of Main Part>

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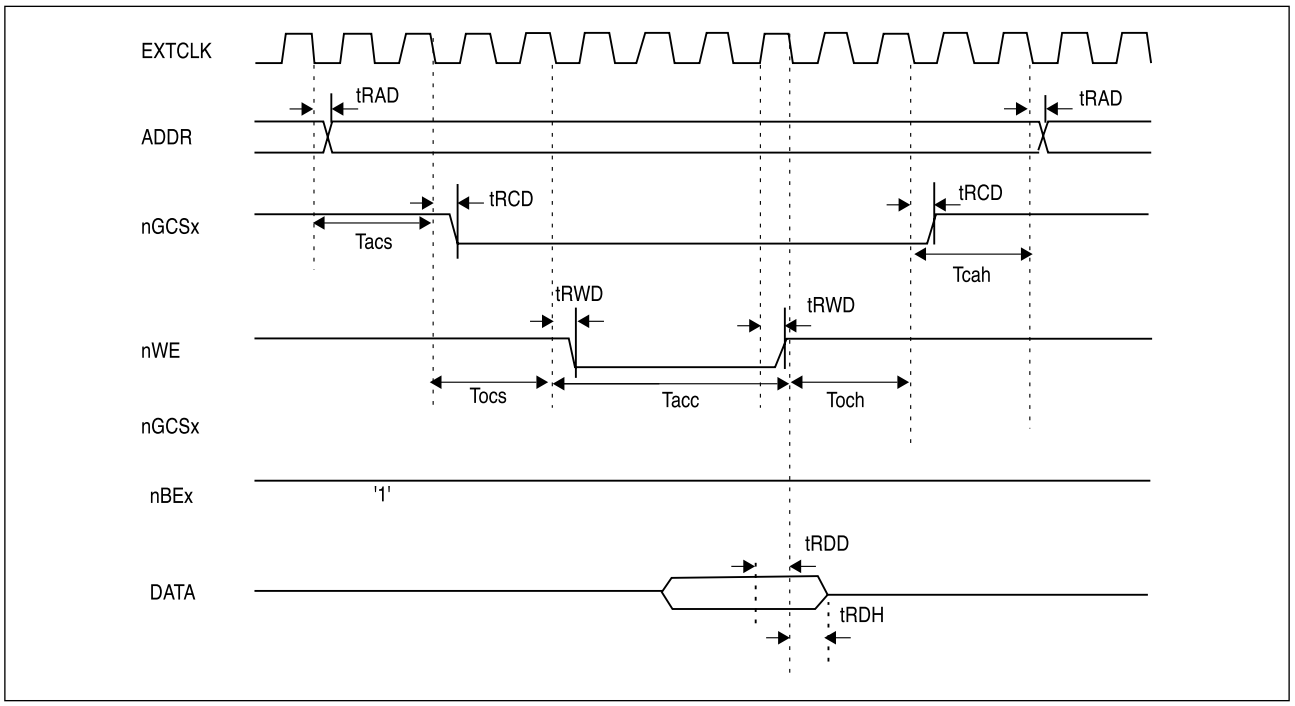
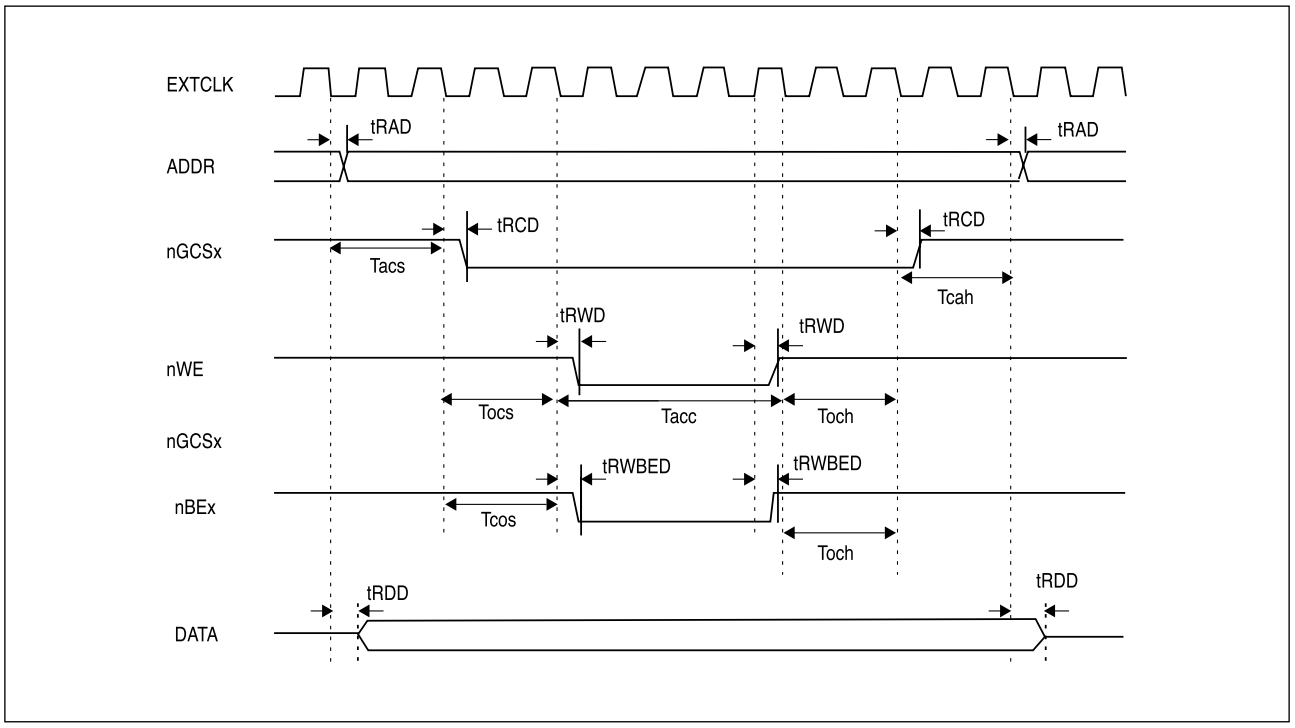


<Figure 3. Flash Memory Read Timing>



<Figure 4. Flash Memory Write Timing>

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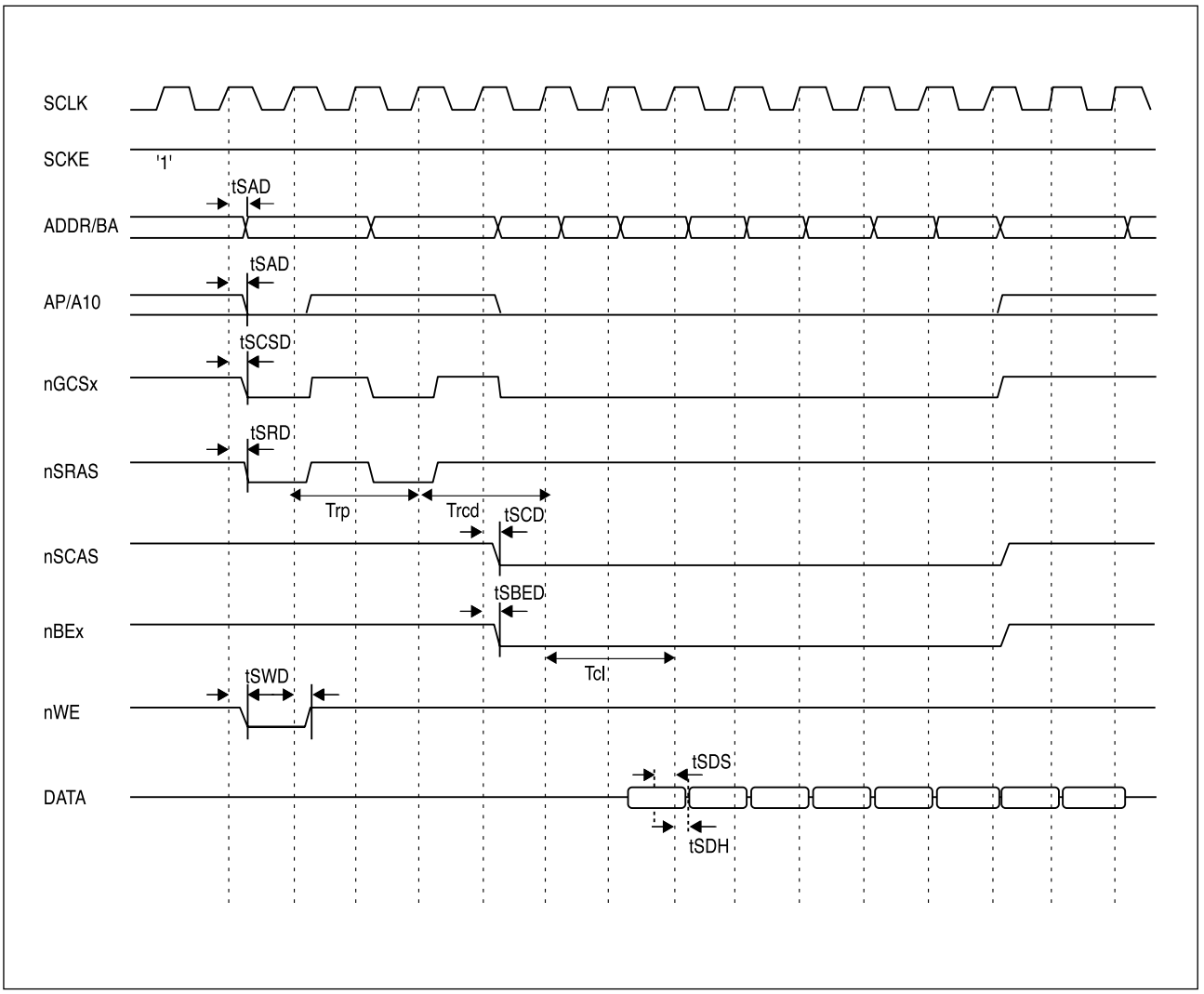

<Figure 5. SDRAM Read Timing>

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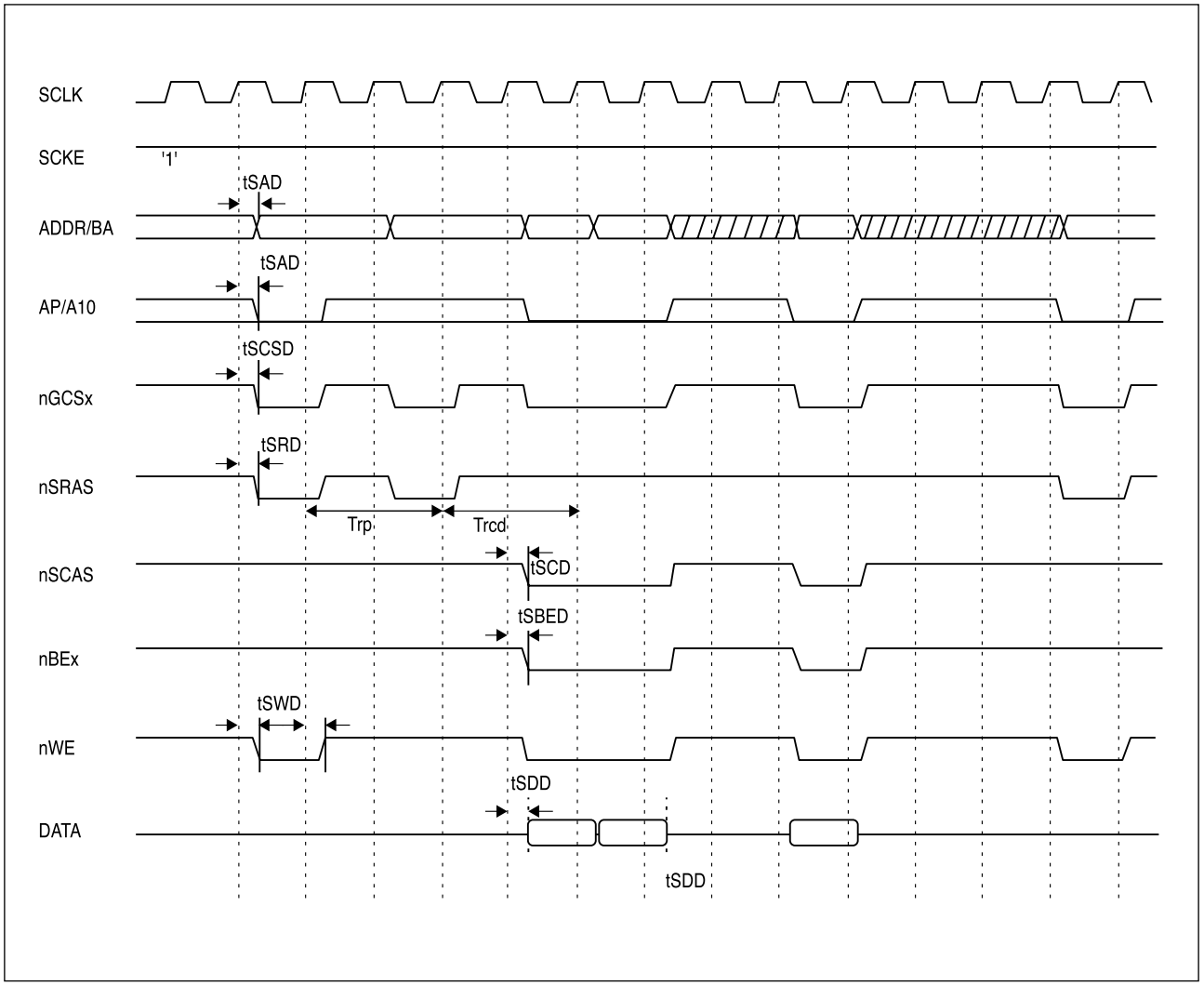

<Figure 6. SDRAM Write Timing>

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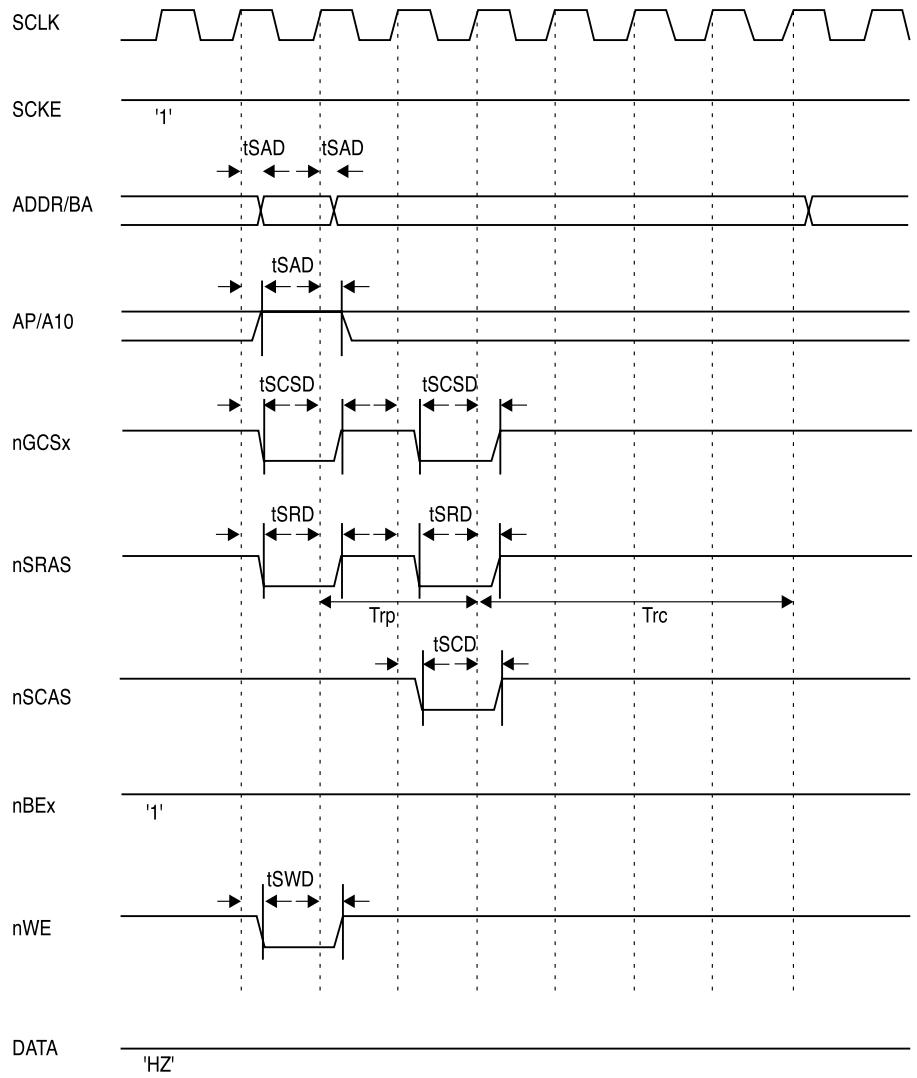

<Figure 7. SDRAM Write Timing>

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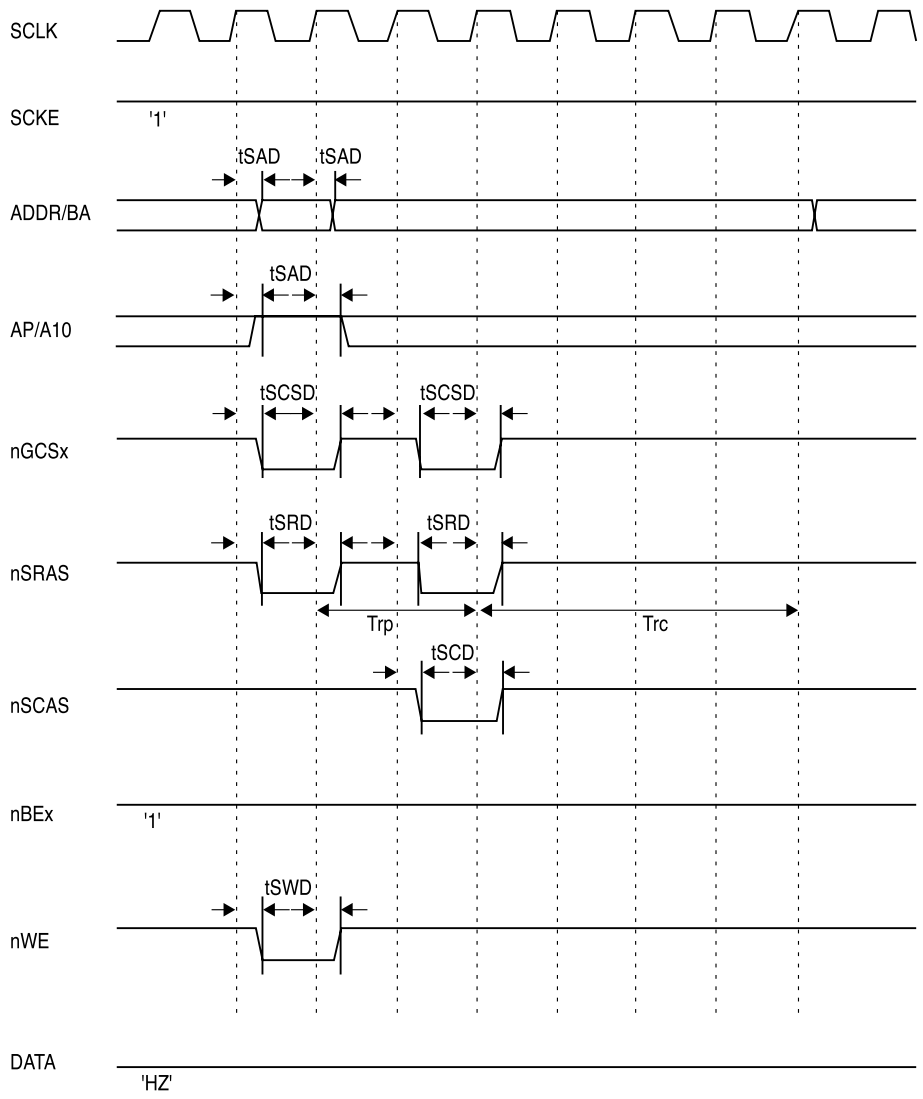

<Figure 8. SDRAM auto Refresh Timing>

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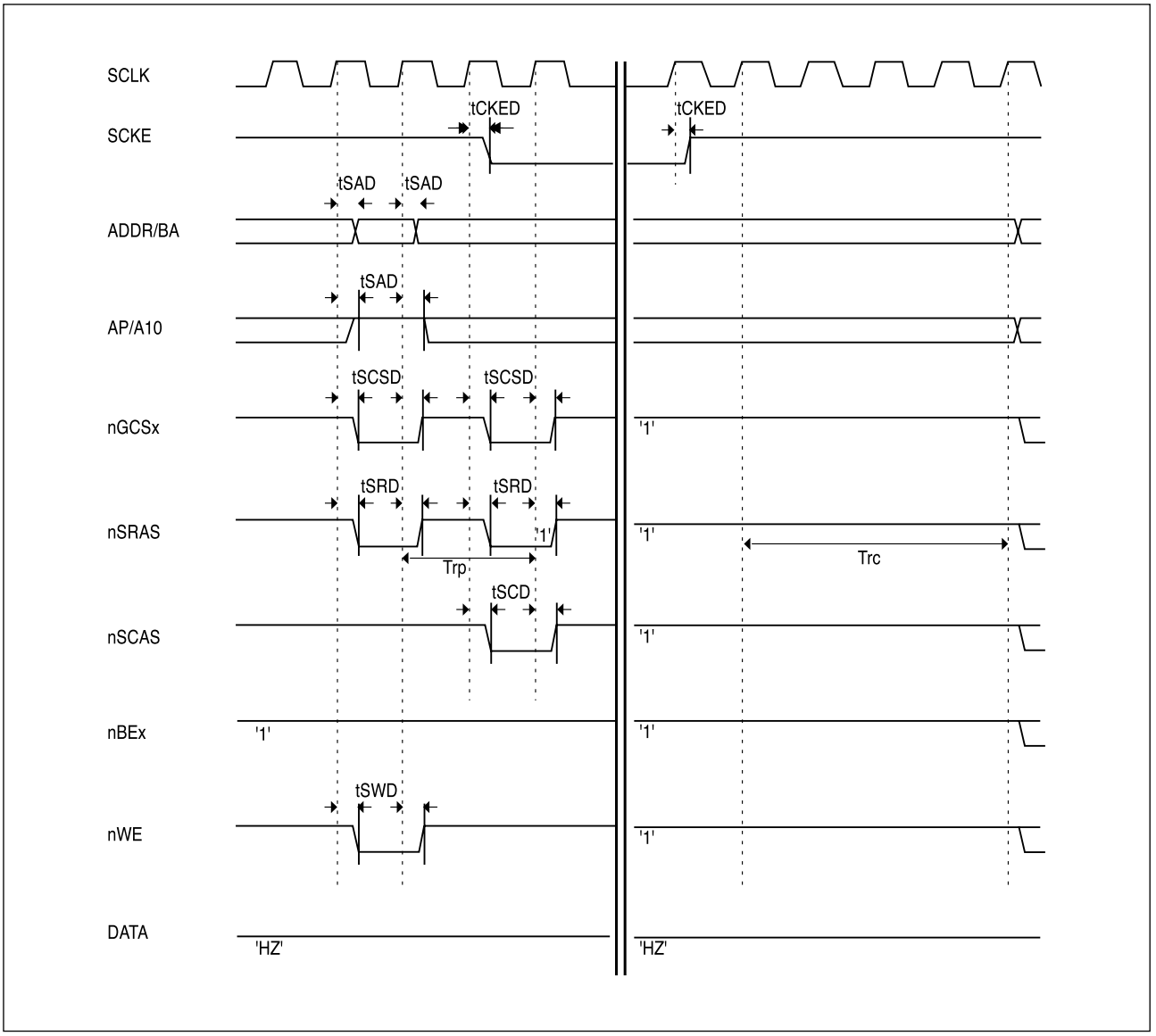

<Figure 9. SDRAM Self Refresh Timing>

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Parameter	Symbol	Min	Typ.	Max	Unit
ROM/SRAM Address Delay	t_{RAD}	-	12	-	ns
ROM/SRAM Chip select Delay	t_{RCD}	-	11	-	ns
ROM/SRAM Output enable Delay	t_{ROD}	-	11	-	ns
ROM/SRAM read Data Setup time	t_{RDS}	-	1	-	ns
ROM/SRAM read Data Hold time	t_{RDH}	-	5	-	ns
ROM/SRAM Byte Enable Dalay	t_{RBED}	-	13	-	ns
ROM/SRAM Write Byte Enable Delay	t_{RWBED}	-	14	-	ns
ROM/SRAM output Data Delay	t_{RDD}	-	14	-	ns
ROM/SRAM external Wait Setup time	t_{WS}	-	1	-	ns
ROM/SRAM external Wait Hold time	t_{WH}	-	5	-	ns
ROM/SRAM Write enable Delay	t_{RWD}	-	14	-	ns
DRAM Address Delay	t_{DAD}	-	12	-	ns
DRAM Row active Delay	t_{DRD}	-	11	-	ns
DRAM Read Column active Delay	t_{DRCD}	-	11	-	ns
DRAM Output enable Delay	t_{DOD}	-	12	-	ns
DRAM read Data Setup time	t_{DDS}	-	1	-	ns
DRAM read Data Hold time	t_{DDH}	-	5	-	ns
DRAM Write Cas active Delay	t_{DWCD}	-	14	-	ns
DRAM Cbr Cas active Delay	t_{DCCD}	-	12	-	ns
DRAM Write enable Delay	t_{DWD}	-	13	-	ns
DRAM output Data Delay	t_{DDD}	-	14	-	ns
SDRAM Address Delay	t_{SAD}	-	4	-	ns
SDRAM Chip Select Delay	t_{SCSD}	-	4	-	ns
SDRAM Row active Delay	t_{SRD}	-	4	-	ns
SDRAM Column active Delay	t_{SCD}	-	4	-	ns
SDRAM Byte Enable Delay	t_{SBED}	-	5	-	ns
SDRAM Write enable Delay	t_{SWD}	-	5	-	ns
SDRAM read Data Setup time	t_{SDS}	-	4	-	ns
SDRAM read Data Hold time	t_{SDH}	-	0	-	ns
SDRAM output Data Delay	t_{SDD}	-	8	-	ns
SDRAM Clock Eable Delay	t_{CKED}	-	5	-	ns

< ROM/SRAM Bus Timing Constants >

(V_{DDP} : 3.3V, V_{DDI} : 2.5V, Ta =25°C, PLCAP=70pf, Max/Min=typ. ±30%)

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3-3-2-3 EXTERNAL DMA part

The function of this part is to bring data from external DEVICE(OASIS:U13) by using GENERAL DMA. If DMA REQUEST(/IP_REQ) is sent from external DEVICE to S3C46MOX(JUPITER3:U21), DMA ACKNOWLEDGE SIGNAL(/IP_ACK) is activated and the GENERAL DMA is driven, so READ STROBE(/RD) in the external DEVICE to bring data from the external DEVICE requiring CHANNEL. To transfer this DATA to the DESTINATION MEMORY, the ADDRESS of the DESTINATION MEMORY, CHIP SELECT and WRITE STROBE(/WR) are generated to store.
That is, if the EXTERNAL DMA is required by the external DEVICE, S3C46MOX(Jupiter3:U21) responds to drive the inside DMA CONTROLLER and then allocate GENERAL DMA to external CHANNEL so that the data may be transferred to MEMORY TO MEMORY or external DEVICE TO MEMORY.

- For more details, see the circuit description, see the circuit description part of IMAGE PROCESSOR (5.3).

3-3-2-4 DRAM control part

Since S3C46MOX(Jupiter3) has the DRAM CONTROLLER build-in, it may be used by connecting DRAM with external memory.
The Control mode of DRAM CONTROLLER provided by S3C46MOX(Jupiter3) is available for EARLY WRITE, NORMAL READ, PAGE MODE, and BYTE/HALF WORD ACCESS, and is supported even by EDO DRAM,and SDRAM as well as, Fast page DRAM.
This system uses SDRAM, and the signal used for READ/WRITE uses /RD,/WR signal used for SYSTEM BUS CONTROL. It is supported with auto REFRESH and also by the Self-refresh mode for DRAM BACK UP. It consists of 2 Banks connected to common /SCS[1:0], /SCAS, /SRAS, /SCLK, /SCKE, /DQM[1:0], each of them may use up to 2M ~ 32M HALF WORD.
In this system, 2 MB is applied as system memory. The area of DRAM is specified in the DRAM MEMORY MAP of Fig. 1, while the related TIMING DIAGRAM in Fig. 5, 6, 7, 8, 9.

3-3-2-5 RTC (REAL TIME CLOCK) part

S3C46M0X real time clock (RTC) operates by the super capacitor although the system power turns off. The RTC has the time data that is stored as the 8 bit BCD (binary coded decimal) format. The data include second, minute, hour, date, day, month, and year. The RTC unit works with an external 32.768 kHz crystal and also can perform the alarm function and round reset function.

Features

- Binary coded decimal format : second, minute, hour, date, month, year
- Leap year generator
- Alarm function : system wake-up from power down mode alarm interrupt in normal mode
- Round reset function : second-rounded reset
- Operation Temperature Range : 0˚C~70˚C

3-3-2-6 PARALLEL PORT INTERFACE division

S3C46MOX(Jupiter3) has the Parallel Port Interface part enabling Parallel Interface with PC.
This part is connected to PC through Centronics Connector in this system, which consists of /ERROR, PE, BUSY, /ACK, SLCT, /INIT, /SLCTIN, /AUTOFD, /STB and 245DIR as the part generating the main control signal used to drive PARALLEL COMMUNICATION. Data transmission method between this part and PC supports the method specified in P1284 Parallel Port Standard (http://www.fapo.com/ieee1284.html) of IEEE. That is, the Compatibility mode, the fundamental transmission method of print data, supports the Nibble Mode(4bits data) supporting the Data Uploading to PC, Byte Mode(8bits data), and ECP(Enhanced Capabilities Port : 8 bits data transmission & receiving) supporting two-way high speed transmission to PC. The Compatibility mode and ECP mode may be simply explained as follows.
The Compatibility mode is generally called Centronics mode and is the protocol used for transmitting data by most of PC. The ECP mode provides two-way high speed communication as the protocol suggested for improved communication with peripheral equipments such as printer and scanner.The ECP mode provides two types of cycles in two-way transmission. They are data and command cycles. Command cycle again has Run-length count and Channel addressing types.
First, RLE (Run Length Encoding) type, having 64-fold compressibility, is available for the real time data compression, and is used usefully for printer and scanner, which have to transmit large capacity of raster image having a series of same data. Next, Channel Addressing is proposed for addressing single structure of multi-device.
For example, although the printer channel is processing the printer image when the fax/printer/scanner have one structure like this system, they may use parallel port for another use. This system does not apply to the parallel port Interface.

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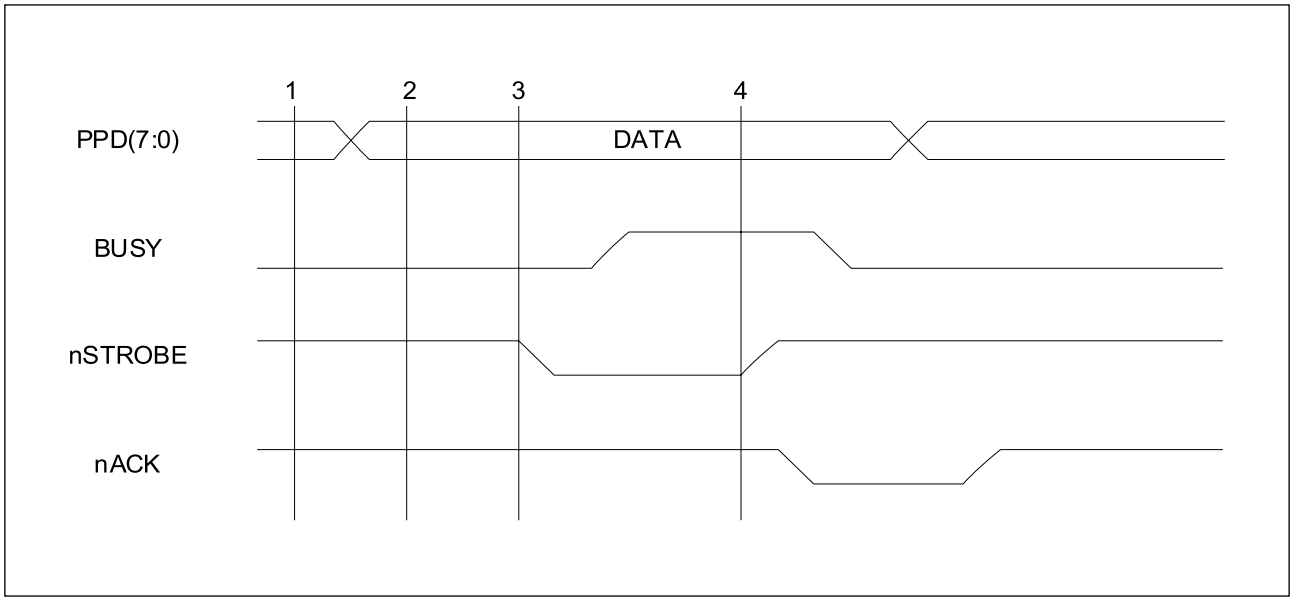
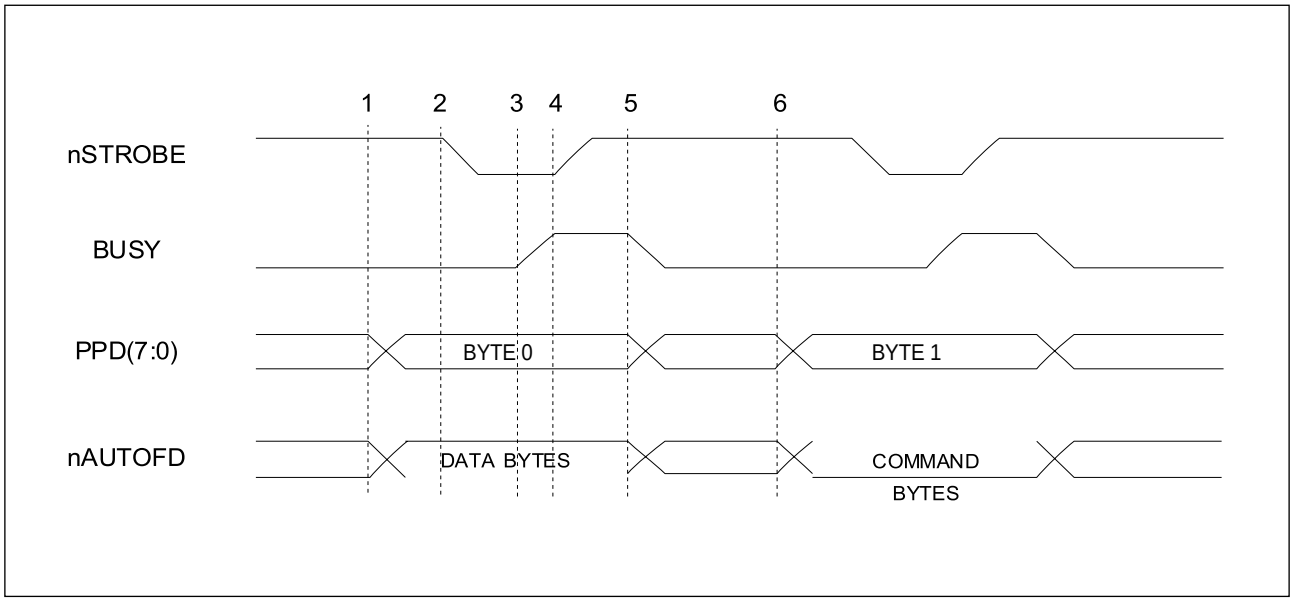


<Figure 10. Compatibility Hardware Handshaking Timing>

1. Write the data to the data register.
2. Program reads the status register to check that the printer is not BUSY.
3. If not BUSY, then Write to the Control Register to assert the STROBE line.
4. Write to the Control register to de-assert the STROBE line.



<Figure 10-1. ECP Hardware Handshaking Timing (forward)>

1. The host places data on the data lines and indicates a data cycle by setting nAUTOFD.
2. Host asserts nSTROBE low to indicate valid data.
3. Peripheral acknowledges host by setting BUSY high.
4. Host sets nSTROBE high. This is the edge that should be used to clock the data into the Peripheral.
5. Peripheral sets BUSY low to indicate that it is ready for the next BYTES.
6. The cycle repeats, but this time it is a command cycle because nAUTOFD is low.

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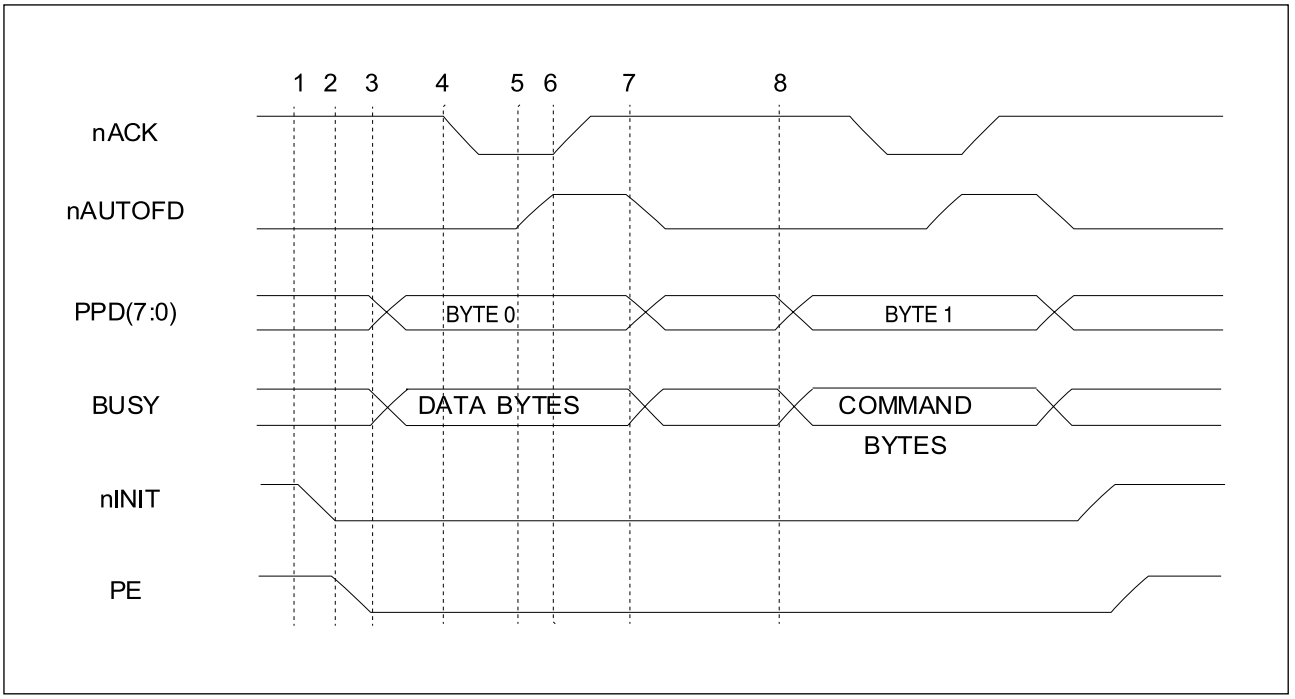

<Figure 10-2. ECP Hardware Handshaking Timing (reverse)>

1. The host request a reverse channel transfer by setting nINIT low.
2. The peripheral signals that it is OK to proceed by setting PE low.
3. The peripheral places data on the data lines and indicates a data cycle by setting BUSY high.
4. Peripheral asserts nACK low to indicate valid data.
5. Host acknowledges by setting nAUTOFD high.
6. Peipheral sets nACK high. This is the edge that should be used to clock the data into the host.
7. Host sets nAUTOFD low to indicate that it is ready for the next BYTES.
8. The cycle repeats, but this time it is a command cycle because BUSY is low.

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3-3-2-7 USB INTERFACE PART

1. USB function description

As the mode of implementing low cost express PC Interface, USB was applied. At USB, PC plays the role of route hub simultaneously by existing in the highest level as the host. That is, the device supporting each USB is connected centering on PC.

The device is available for Interface for the maximum of 127. USB cable is composed of total of a set of twisted pair and 2 power lines. Cables have two types.

One is used for express transmission of 12Mbps and may be extended as long as 5m. The part for implementing USB function is included in S3C46MOX(Jupiter3).

For Interface of USB, pull-up of 15KΩ is interfaced to the data line of high level instruments, and, among data lines of lower level instruments, pull-up resistance of 1.5KΩ is interfaced to any one.

At this time, D+ line is pulled up for Full Speed device, and, for Low Speed device, D-line is pulled up. For upper level instruments(Host, HUB) speed of device is classified interfaced to low level by detecting any one among D+ and D-. If both lines are in the level of GND at the same time, device is judged that low device is not interfaced. In the transmission mode of USB, there are

(1) Control transmission,

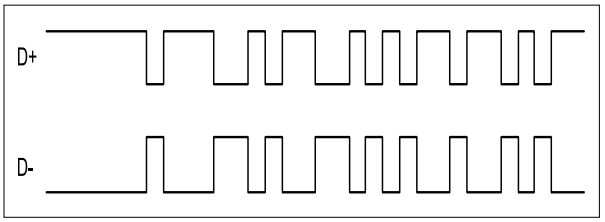
(2) Interrupt transmission,

(3) Bulk transmission, isochronous transmission.

Control transmission is for Host to find out configuration information from USB device. This is conducted when device is interfaced. Interrupt transmission is used when small quantity of data is sent periodically. Interval value may be known from device in the case of initial setting. Bulk transmission is valid in case of trying to transmit data in large quantities or in case of transmitting them accurately. Isochronous transmission should be assured of bandwidth, and is used when transmitting large quantities of information. Data in voice is used where delay is not allowed but small error is allowed. At USB coding mode and bit stupping are being conducted. First, in case original data is 1, bit shall not change, and only when original data is 001, it shall be inverted. Only while data is 1, 1 and 0 shall be repeated. Also, in case 1, original data, is continued in 6 bit, 0 shall be inserted, Also, in the 1st phase of packet, data in the synchronized pattern shall be sent. About more detailed information regarding USB, see **http//:www.usb.org.**

2. operation description

This system, when Host and USB cables are connected, and when +5V is detected in power detector inside chip and Vbus(U21-98), 3.3V comes out through Pull-uP terminal. This is also connected to D+ in pattern of hardware and supports Full-speed. Utilizing Configuration Endpoint, EPO, in USB controller, Plug & Play function is operated. Exchange of information between PCs is accomplished through D+(U21-95) and D-(U21-96) terminals. This terminal decides transmission speed depending on connection of regulator output in USB controller, and decides size of signal following USB and SPFC. Signal of general D+ and D- terminals are same as Figure 10-3.



< Figure 10-3. USB Signal Line DIAGRAM >

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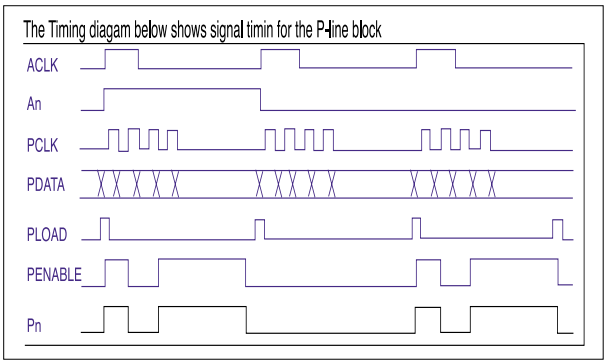
3-3-2-8 HEAD control part

1. Entire description

As part to drive INKJET HEAD, it is composed of ACLK, AGATE, LDCS, LATCHCTL, PCLK, PDATA[3:0], PLOAD, PENABLE signals for controlling Spitfire of CR B'D generating signal, which is driving Nozzle of Head, and PH_ID[1:0] and OK2Print signals receiving from Spitfire.

Here,HEAD being used here is DOUBLE HEIGHT PRINT HEAD, and MONO is configured with 208 NOZZLE, and COLOR is with 192 NOZZLE.



<Figure 11 HEAD Control Part Timing Diagram>

2. A-LINE driving circuit

13 Address Lines are input into 13 Address Counters in sequence at Rising edge of ACLK signal, which is input serially into Spitfire. Output of this Counter was connected to each A-line driver, and this driver output becomes A-line signal. The sequence of signal input into Address Counter is decided by ADIR, and if it is ADIR=0, it is input in sequence of A13A1, and if it is ADIR=1, in sequence of A1 => A13. AGATE signal is used to reset Address Counter. If it becomes AGATE=1, A-Line output becomes Low state. The cycle of ACLK is 1.5ß¡ in minimum, and Sink current of each Driver is 60mA.

3. P-LINE drive circuit

P-Line values are clocked to 4-bit Serial to Parallel Shift Register Clock in Spitfire ASIC, and ASIC shall clock-in P-line NO. of fitting value at Rising Edge of PCLK. These values are latched to Holding register at Rising Edge of PLOAD. PLOAD Pulse Duration is 50n, and P-line value of Holding Register is done AND with PENABLE signal in order to generate appropriate Fire Pulse. PLCK is available for handling as much as 4MHz. Drive Current of P-line is 400mA. Data of P1°≠P4 is shifted to PDATAO, that of P5-P8 shifted to PDATA1, that of P9-P12 shifted to PDATA2, and that of P13-P16 shifted to PDATA3.

4. Control Signal

- The signal loaded on PDATAO - PDATA2 at Rising edge of LATCHCTL(Latch Control Nibble) is used as function as follows in Spitfire.

  - PDATA0 == ADIR —> Low : ACLK is operated in Count Down, High : ACLK is operated in Count Up.
  - PDATA1 == When Fault Test —> High, check whether P-Line of Head became short with GND.
  - PDATA2 == When Print Head ID Check —> high, make sure that Check mode is set, and, after that, by using the PDATA0~PDATA2 LIne, make A1-A3 signal for sending, and Head ID shall come out with PH_IDn output. At this time ID could be displayed only if each Substrate heater is turned on.

- The signal loaded into PDATAO-PDATA3 at Rising edge of LDCS(LoadHtrcs) signal is used in the following functions in Spitfire.

  - PDATA0 == BLKHTR—> High : Turn on Substrate Heater of Mono Head.
  - PDATA1 == COLHTR—> High : Turn on Substrate Heater of Color Head.
  - PDATA2 == nHSM—> Low : Enable Select Signal of Mono Head.
  - PDATA3 == nHSC—> Low : Enable Select Signal of Color Head.

When Substrate Heater is turned on, Over-current Check circuit is operated, automatically, and,if the current is above 750mA, the printer stops operation after OK2PRT becomes low.

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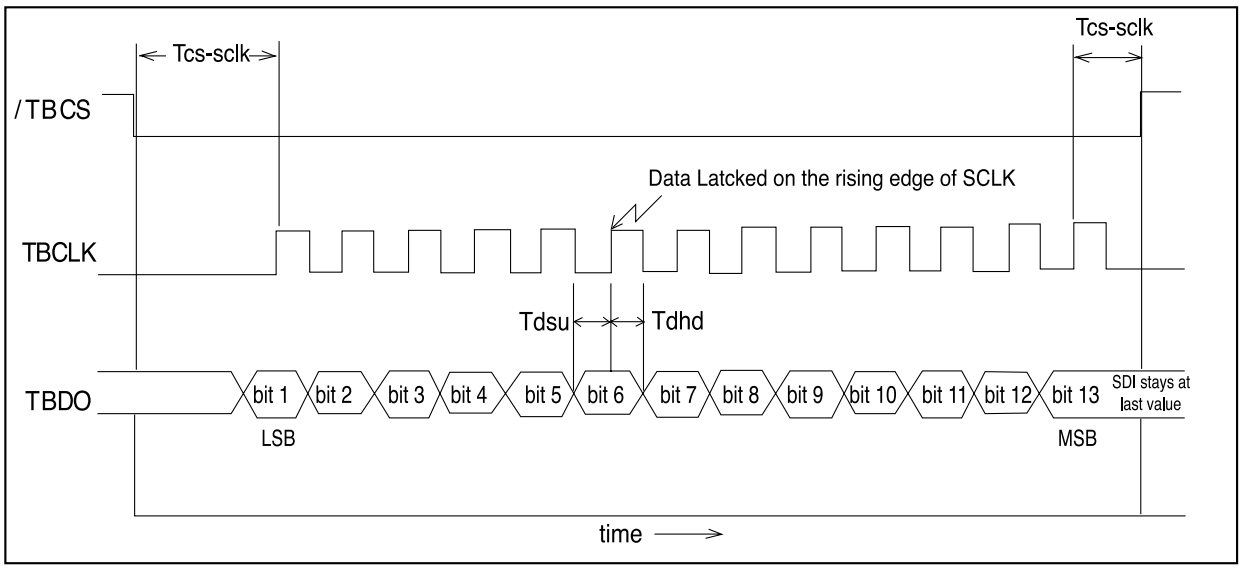
3-3-2-9 SYNCHRONOUS SERIAL INTERFACE part

As the part interfacing with THUNDERBOLT ASIC(U4), it consists of /TBCS,TBCLK,TBDO. In sending SERIAL DATA of 13 BIT to Thunderbolt ASIC, meaning of each bit is as follows. BIT 1 is the bit to do On/Off VPH(+11.82V), BIT [2:7] is the bit for driving MOTOR 1, BIT [8:13] is the bit to drive MOTOR 2. MOTORs are available for being used as STEPPER MOTOR and DC MOTOR respectively.

3-3-2-10 MOTOR control part (DIR, PWM, LFPHA,LFPHB, LFIA[0:1], LFIB[0:1])

S3C46MOX(Jupiter3) is arranged to support one Step motor and one DC motor. This system does not use the Motor control part provided by S3C46MOX(Jupiter3).

	STEPPER MOTOR	DC MOTOR
BIT 1	VPH_ENABLE	VPH_ENABLE
BIT 2	MOTOR1_CURR_I1_PHASEB	Not used in this mode.
BIT 3	MOTOR1_CURR_I0_PHASEB	Not used in this mode.
BIT 4	MOTOR1_DIR_PH_B	Not used in this mode.
BIT 5	MOTOR1_CURR_I1_PHASEA	Not used in this mode.
BIT 6	MOTOR1_CURR_I0_PHASEA	Not used in this mode.
BIT 7	MOTOR1_DIR_PH_A	MOTOR1_DIRECTION
BIT 8	MOTOR2_CURR_I1_PHASEB	Not used in this mode.
BIT 9	MOTOR2_CURR_I0_PHASEB	Not used in this mode.
BIT 10	MOTOR2_DIR_PH_B	Not used in this mode.
BIT 11	MOTOR2_CURR_I1_PHASEA	Not used in this mode.
BIT 12	MOTOR2_CURR_I0_PHASEA	Not used in this mode.
BIT 13	MOTOR2_DIR_PH_A	MOTOR2_DIRECTION



< Figure 12 SYNCHRONOUS SERIAL INTERFACE TIMING DIAGRAM >

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3-3-2-11 GENERAL PURPOSE I/O PORT of S3C46MOX(Jupiter3)

1. J3 Assigned GCS Ports

PORT NAME	PIN NO	I/O	SIGNAL NAME	DESCRIPTION	
				H	L
nGCS0	136	O	/ROM_CS	FLASH MEMORY CHIP SELECT	
nGCS1/GOP16	137	O	/IP_CS	OA-980 CHIP SELECT	
nGCS2/GOP17	138	O	/MODEM_CS (nPCM_CS)	MODEM CHIP SELECT (F/B - PCMCIA CHIP SELECT)	
nGCS3/GOP18	139	O	/GPIO_CS (nSM_CS)	EXTENDED GPIO CHIP SELECT	
nGCS4/GOP19	141	O	RESERVED (nCF_CS)	(F/B - COMPACT-FLASH CARD CHIP SELECT)	
nGCS5/GOP15/PDE	142	O	245DIR	P1284 DIRECTION CONTROL	
nGCS6:nRAS0:nSCS0 /GOP13	34	O	/SCS0	SDRAM0(64Mb) CHIP SELECT	
nGCS7:nRAS1:nSCS1 /GOP14	35	O	/SCS1	SDRAM1(16Mb) CHIP SELECT FOR JTEG	

2. J3 Assigned GPI Ports

PORT NAME	PIN NO	I/O	SIGNAL NAME	DESCRIPTION	
				H	L
GPI0/TMS	42	I	TMS	TMS for JTAG	
GPI1/nAUTOFD	75	I	/P_AUTOFD	P1284 CONTROL SIGNAL	
GPI2/nSLCTIN	71	I	/P_SLCTIN		
GPI3/nINIT	74	I	/P_INIT		
GPI4/nSTROBE	72	I	/P_STB		
GPI5/RXD1/SCLK1	104	I	OK2PRT (HYPER_RXD)	NO FAULT IN PRINT HEAD	FAULT IN PRINT HEAD OK2PRINT INPUT (F/B - UART RXD for HYPER-TERMINAL)
GPI6/RXD0	101	I	OPE_RXD	UART RXD for OPE	
GPI7/CRY/LFPHA_IA0	89	I	/P_PICKUP	IDLE	PAPER DETECTED P_EXIT SENSOR INPUT
GPI8/CRX/LFPHA_IA1	88	I	COVER_OPEN	COVER OPEN	COVER CLOSED COVER_OPEN SENSOR INPUT
GPI9/LSU_nFSYNC /CHY/CRPHA_IA0	122	I	CHYY	CHX for CR ENCODER	
GPI10/PVC_nHSYNC /CHX/CRPHA_IA1	121	I	CHXX	CHY for CR ENCODER	
GPI11/nXDREQ0	133	I	/IP_REQ	IDLE	DMA REQUEST FROM OASIS DMA REQUEST for OA-980
GPI12/nXDREQ1	135	I	PH_ID2	COLOR HEAD DATA INPUT	
GPI13/EINT0	129	I	/IP_INT	INTERRUPT for OA-980	
GPI14/EINT1	130	I	/M_IRQ	MODEM INTERRUPT INACTIVE	MODEM INTERRUPT ACTIVE /MODEM_IRQ INPUT (F/B - OK2PRINT INPUT)
GPI15/EINT2	131	I	PH_ID1	MONO HEAD DATA INPUT	
GPI16/nWAIT	99	I	/P_EMPTY (/CF_WAIT)	IDLE	PAPER EMPTY STATE (F/B - COMPACT-FLASH WAIT IN)

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3. J3 Assigned GPO

PORT NAME	PIN NO	I/O	SIGNAL NAME	DESCRIPTION	
				H	L
GOP0/nRESET_OUT	106	O	/F_POR	WATCHDOG RESET OFF	WATCHDOG RESET ON (Watchdog Reset Out & FLASH RESET OUT)
GOP1/TONE_OUT	120	O	KEY CLICK (nOPE_RST)	KEY CLICK (F/B - OPE RESET ON)	
GOP2/nFAULT	76	O	/P_ERROR	P1284 CONTROL SIGNAL	
GOP3/PERROR	78	O	P_PE		
GOP4/SELECT	77	O	P_SLCT		
GOP5/nACK	80	O	/P_ACK		
GOP6/BUSY	79	O	P_BUSY		
GOP7/TXD0	100	O	OPE_TXD	UART TXD for OPE	
GOP8/PLOAD	118	O	PLOAD	PLOAD for SPITFIRE	
GOP9/nXDACK0	132	O	/IP_ACK	IDLE I DMA ACKNOLEDGE TO OASIS DMA ACK. for OA-98	
GOP10/SCKE	38	O	SCKE	SDRAM CLOCK ENABLE	
GOP11 /nBE0:nWE0:DQM0	39	O	DQM0	SDRAM0 MASK SIGNAL	
GOP12 /nBE1:nWE1:DQM1	40	O	DQM1	SDRAM1 MASK SIGNAL	
GOP13 /nGCS6:nRAS0:nSCS0	34	O	/SCS0	SDRAM0(64Mb) CHIP SELECT	
GOP22/ADDR22	29	O	A22	64Mb SDRAM BA1 SIGNAL	
GOP23/ADDR23	30	O	/OPE_RST	OPE RESET OUT	
GOP24/ADDR24	31	O	/IP_RST	OA-98 RESET OUT	

4. J3 Assigned Extended GPIO

PORT NAME	PIN NO	I/O	SIGNAL NAME	DESCRIPTION	
				H	L
DATA0		I	/HOOK_OFF1	HANDSET HOOK ON	HANDSET HOOK OFF
DATA1		I	/HOOK_OFF2	EXT. PHONE HOOK ON	EXT. PHONE HOOK OFF
DATA2		I	/RING_DET	IDLE	RING DETECTED
DATA0		O	TONE_CTL	LINE MONITORING	KEY CLICK
DATA1		O	DP	DP DIAL(RECALL) PULSE ON	DP DIAL(RECALL) PULSE OFF
DATA2		O	/CML_CTL1	CML_CTL1 ON	CML_CTL1 OFF
DATA3		O	/CML_CTL2	CML_CTL2 ON	CML_CTL2 OFF
DATA4		O	TX_CTL	RX PATH SIGNAL	TX LINE SIGNAL
DATA5		O	RX_CTL	RX LINE	REMOTE
DATA6		O	/SPK_CTL	AUDIO AMP OFF	AUDIO AMP ON

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3-3-3 RESET circuit

This system is configured with PRIMARY RESET(/POR) of Power Reset, Reset by WATCH DOG TIMER, external PRIMARY RESET, and SECOND RESET(/_F_POR) which was done AND. PRIMARY RESET SYSTEM is used for resetting MAIN CONTROLLER(U21) when System Power is authorized, and SECOND RESET resets FLASH MEMORY(U27). Figure 15 below is BLOCK DIAGRAM related to the reset of entire system.

When +3.3V reaches 3.1V so that system may operate, POWER MONITOR(U14) moves to High(+3.3V) after maintaining low(OV) in the degree of 50mS-200mS output while monitoring it. This Reset signal is input into MFP CONTROLLER(S3C46MOX(Jupiter3 : U21) right away, and MFP CONTROLLER becomes awake. And it releases /F_POR after MCLK 1 clock.

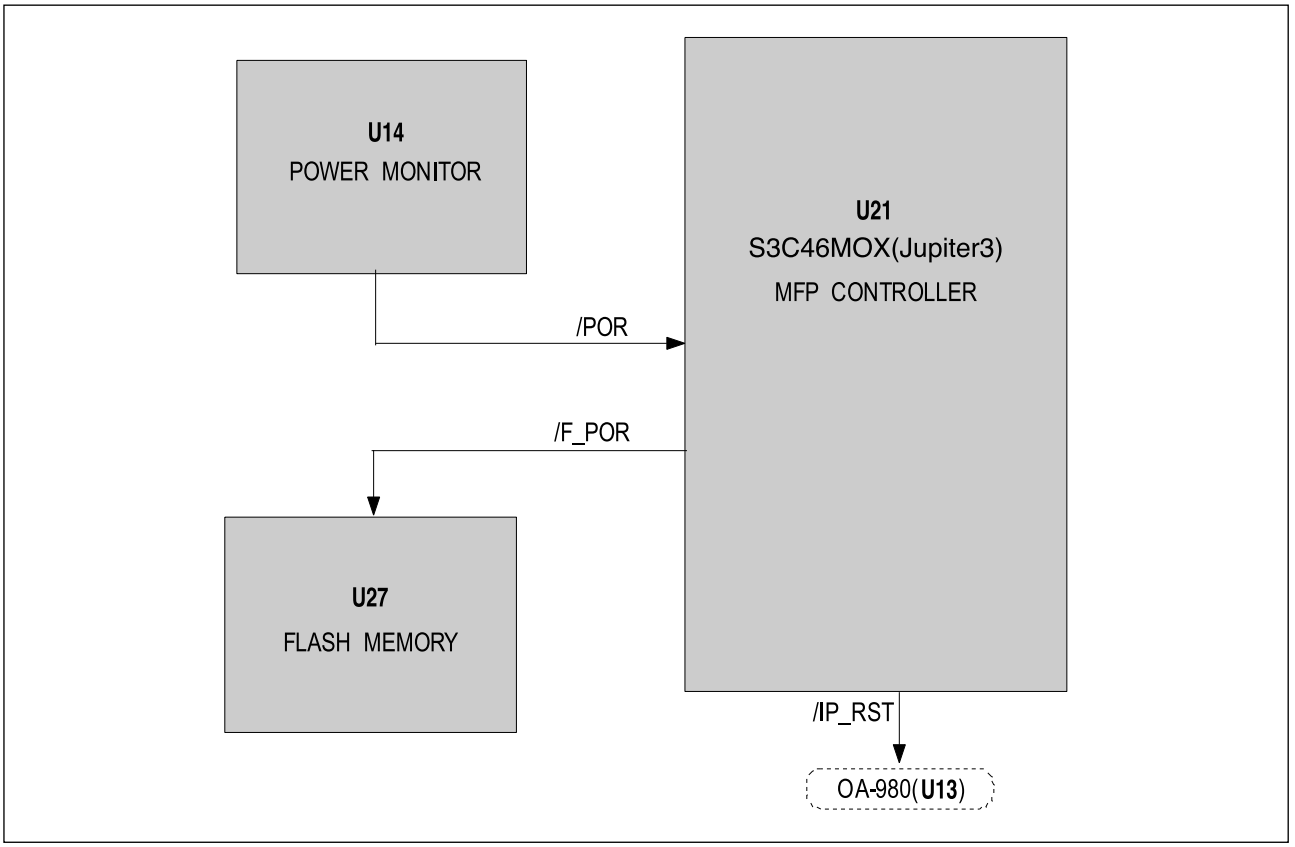
3-3-3-1 POWER MONITOR (U14)

Since +3.3V power supplied to XC61FN3112MR is unstable, when it becomes 3.1V(3.038V~3.162V), it is checked as the POWER FAILURE. And the output terminal of XC61FN3112MRF becomes LOW(0V),it is applied to S3C46MOX(Jupiter3)(U21), and RESET(LOW ACTIVE) is operated When S3C46MOX(Jupiter3) Reset is cancelled, FLASH MEMORY connected to /F_POR of S3C46MOX (Jupiter3) is Reset together.

Output terminal of XC61FN3112MRF is pulled up 100KΩ in the structure of Open drain.

3-3-3-2 WATCH DOG OUTPUT (/F_POR)

Since WATCH DOG TIMER, which is Programmable Counter in S3C46MOX(Jupiter3) is set as disable for INITIAL STATE, it shall be set as Disable so that it won't operate, and after it is initialized for operation, it shall be reused by setting it Enable. When Watch Dog Reset occurs, it is about 10mS depending on the value set at the initial stage. And Counter value of Watch Dog Timer is changed by the program. Reset signal (/F_POR,U21-106) shall be generated, and entire system shall be Reset and initialized.



< Figure 13. POWER RESET BLOCK DIAGRAM >

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3-4 MEMORY

3-4-1 General description

MEMORY applied in this system are FLASH MEMORY (U27) of 1MB, SDRAM(U25) of 2MB.

3-4-2 MEMORY configuration

By each CHIP SELECT (/ROM_CS, /SCS0, /SD_RAS ,/SD_CAS), FLASH MEMORY and SDRAM are selected, and DATA is accessed by HALF WORD unit.

3-5 Image processing part (U13)

3-5-1 General description

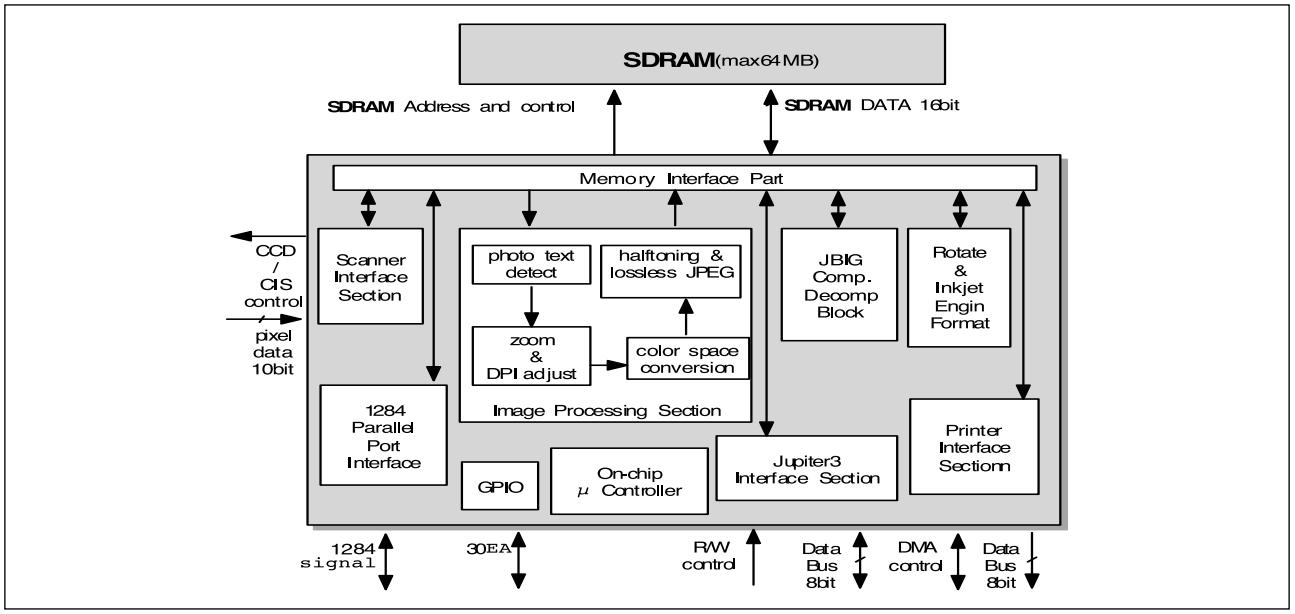
Image Processor OA-980(U13) is mainly configured with On-chip µ Controller(8bit), Scanner Interface Section(PI), Image Processing Section(IP), Memory Interface Section(MI), JBIG Comp & Decomp Section, Rotate and Inkjet Engine Section, Printer Interface Section(PO), 1284 Parallel Port Interfaced and Host Interface Section(HI). (See Figure 14)

3-5-1-1 Physical

Core	Process	Drive power /frequency	Package	Design
8bit Micro-controller	0.35U CMOS	3.3V 75MHz	208pin QFP	OASIS

3-5-1-2 Features & Functions

- 10bit scanning interface
: Supports CIS and CCD interface.
Needs external ADC(up to 16bit).
- Image processing Section
: Full quality RGB to CMYK or 6 color conversion
Photo/Text detect allows mixed documents.
Arbitrary image scaling using true interpolation.
Automatic contrast and brightness correction.
Error diffusion or programmable dither arrays.
- JBIG compression block
: JBIG/MH/MR/MMR Comp. & Decomp.
- Inkjet engin format
: Rotates data to suit the Lexmark engin format
- Printer Interface section
: Supports a single byte DMA with 150MHz clock speed.
- Microcontroller interface part
: 8bit multiplexed bus acts as address and data bus
- General purpose input and output port
: 30 GPIO pins.



<Figure 14. OA-980 Block Diagram>

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3-5-2 OA-980 Description by functions

3-5-2-1 Clock Control Section

Internal drive frequency operates classified into two parts. Almost all On-chip µ Controller(8bit) Module drives by Main_clock, and Printer Interface Section(PO) only drives by Base_clock. Main_clock and Base_clock may be set with frequency each desires by receiving Clock supplied from outside by PLL Logic.

At present, system Main_clock and Base_clock are each set in 48MHz, and may be checked at SDRAM_CLK of SDRAM(U2). Clock supplied from outside does not use separate crystal, but 48MHz is supplied by IP_CLK, CLK_Out of Jupiter3(U21).

The one which pulled up Main_EXT(pin46) and Base_EXT(pin43) is the Option using internal PLL, and, at the time of Pull-up, it does not use internal PLL, but just use Clock supplied to Main_CLK(pin45) and Base_CLK(pin42) as Main_clock and Base_clock.

3-5-2-2 Internal Microcontroller

8bit RISC Microcontroller is built-in, and Address area which Micro-controller control is 64kbyte. At the same time when cache is built in for control of more efficient SDRAM, it possesses Hook function, namely the internal Boot ROM 256byte required for self-initialization function, too.

1. Memory Map

0x0000 .... 0x00ff	Boot ROM
0x0100 .... 0xfbff	SDRAM program store and SDRAM stack
0xfc00 .... 0xffff	HW registers

2. Power On/Off Reset

• Power On Reset

Depending on the signal state of Reset_L(pin35), OA-980 may be reset in the manner of hardware. Reset is on at “Low” state and, at “High” state, Reset is Off. Accordingly, in order for OA-980 to operate normally, after the System initialization, the /IP_RST of Jupiter3(U21-31) shall be converted to “High” state. In order for safe Hardware Reset to be accomplished, it should be maintained in “Low” state for more than 1000 Main_clock(10uS).

• Power Off Reset

PWR_down(pin107), for SDRAM(U2) to advance to the Self Refresh Mode Reset_L(pin35) at the Power Safe Mode, shall advance to the Reset Mode earlier than the minimum of 1uS. This System does not use it.

3. Hook function : Self-initialization function

In case self ROM is connected to OA-980 as in Figure (15), although the execution file is downloaded to SDRAM, the execution file is initialized by receiving download from Memory. This execution file is the ROM File supporting so that all functions of Image processing related to OA-980 as well as register setting value required for initialization(Copy, PC scan, MultiMediaCard Print) may operate normally.

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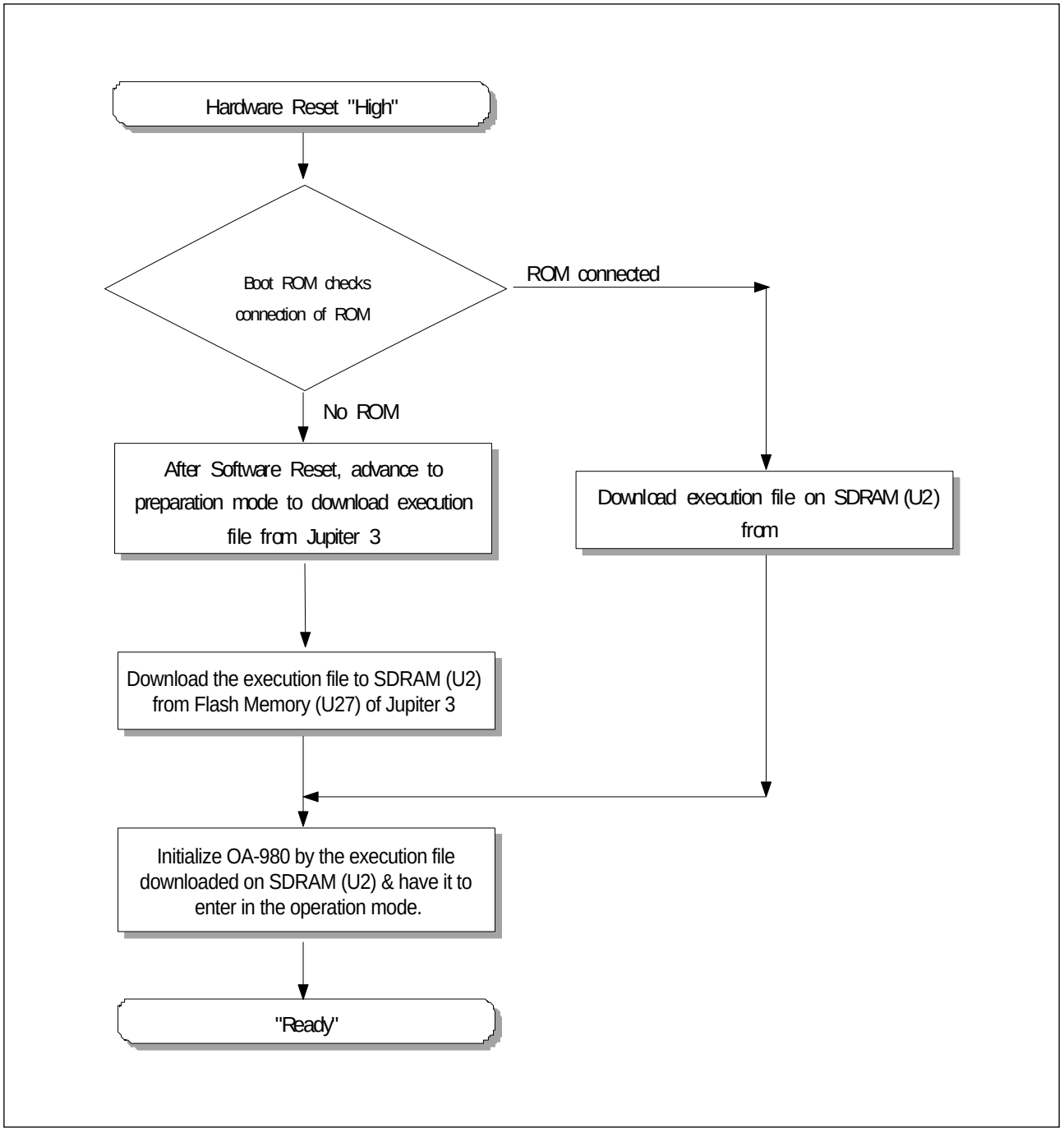
Hardware Reset "High"
Boot ROM checks connection of ROM
ROM connected
No ROM
After Software Reset, advance to preparation mode to download execution file from Jupiter 3
Download execution file on SDRAM (U2) from
Download the execution file to SDRAM (U2) from Flash Memory (U27) of Jupiter 3
Initialize OA-980 by the execution file downloaded on SDRAM (U2) & have it to enter in the operation mode.
"Ready"

<Figure 15. Boot Code Flow Diagram>

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3-5-2-3 Host Interface Section(HI : Jupiter3 interface section)

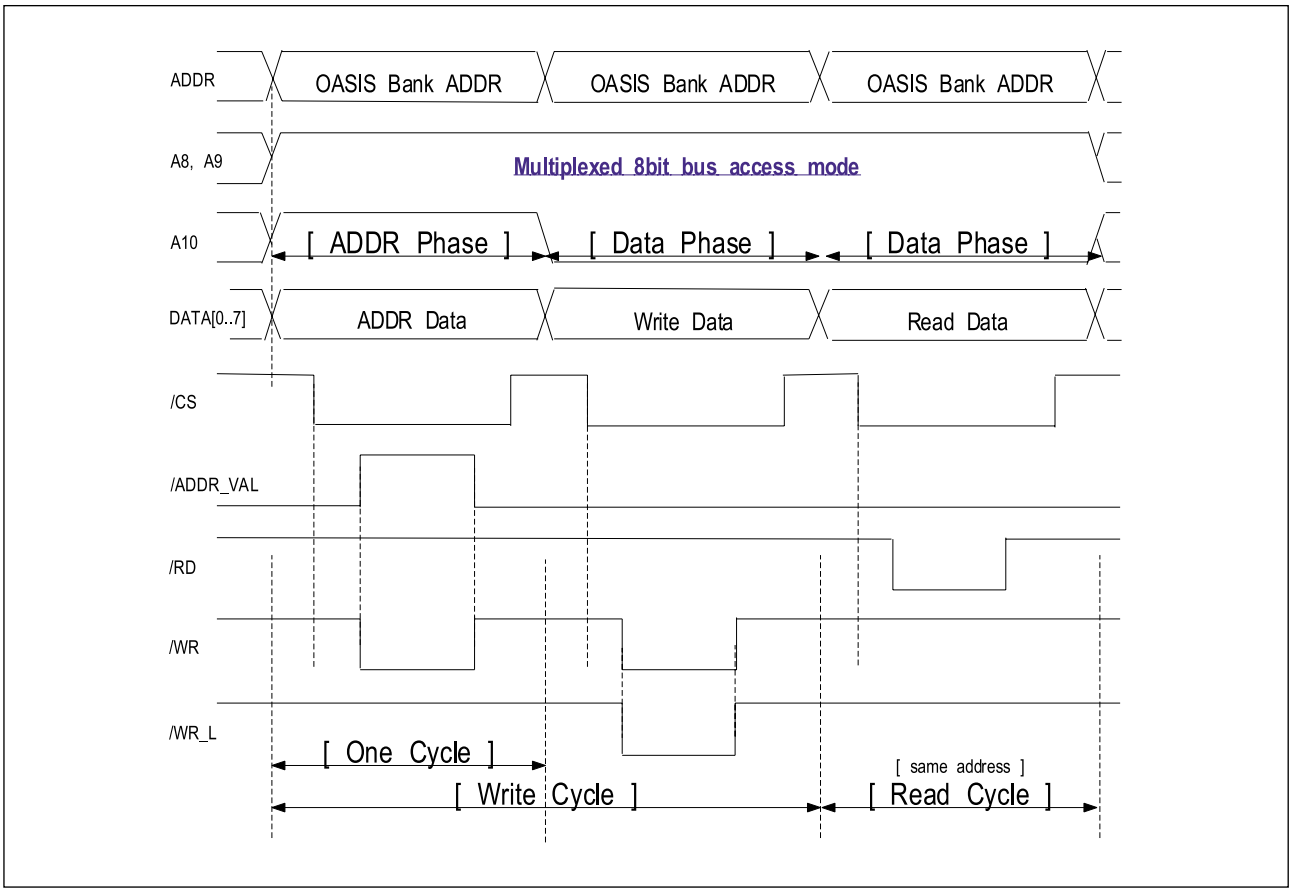
Unlike the existing DuoIP sequence, OA-980 exchanges Command and data with Jupiter 3 in the Multiplexed 8bit Bus(data & address) mode. Namely, it does not receive Address and Data simultaneously, but receive data after receiving Address first using Data Bus of Jupiter3.

HI Section also supports the data movement in the DMA mode. Accordingly, when transmitting large capacity of Image data(RGB data), it uses the DMA mode.

1. Multiplexed 8bit Bus(data & address) mode

nce Jupiter3 may not support Multiplexed 8bit Bus(data & address) mode used by OA-980, it configured a circuit additionally so that mutual Interface may be possible by making required signal using two NOR GATE(U31) and one OR Gate(U38).

As REG_ADDR_VAL(pin27) signal is the signal for OA-980 to play a role of informing that value input into 8bit of OA-980 Bus is not Data but Address value, when ADDR(10) is “High” and /IP_CS, /WR “Low,” “High” shall be generated as shown in the circuit diagram. See figure (16). At this time, since /WR_L(pin31), the Write signal of OA-980, should be maintained in “High,” the signal shall be generated in case actual Write is accomplished with one OR Gate(U38), namely, only when ADDR(10) is “Low,” When REG_ADDR_VAL (pin27) is “High,” input the Address value of OA-980, and when “Low, from the standpoint of Jupiter3, it may Read or Write One Byte Data using two Cycles by Reading or Writing relevant Data of (to) Address.



<Figure 16. Hi Block Timing diagram(1)>

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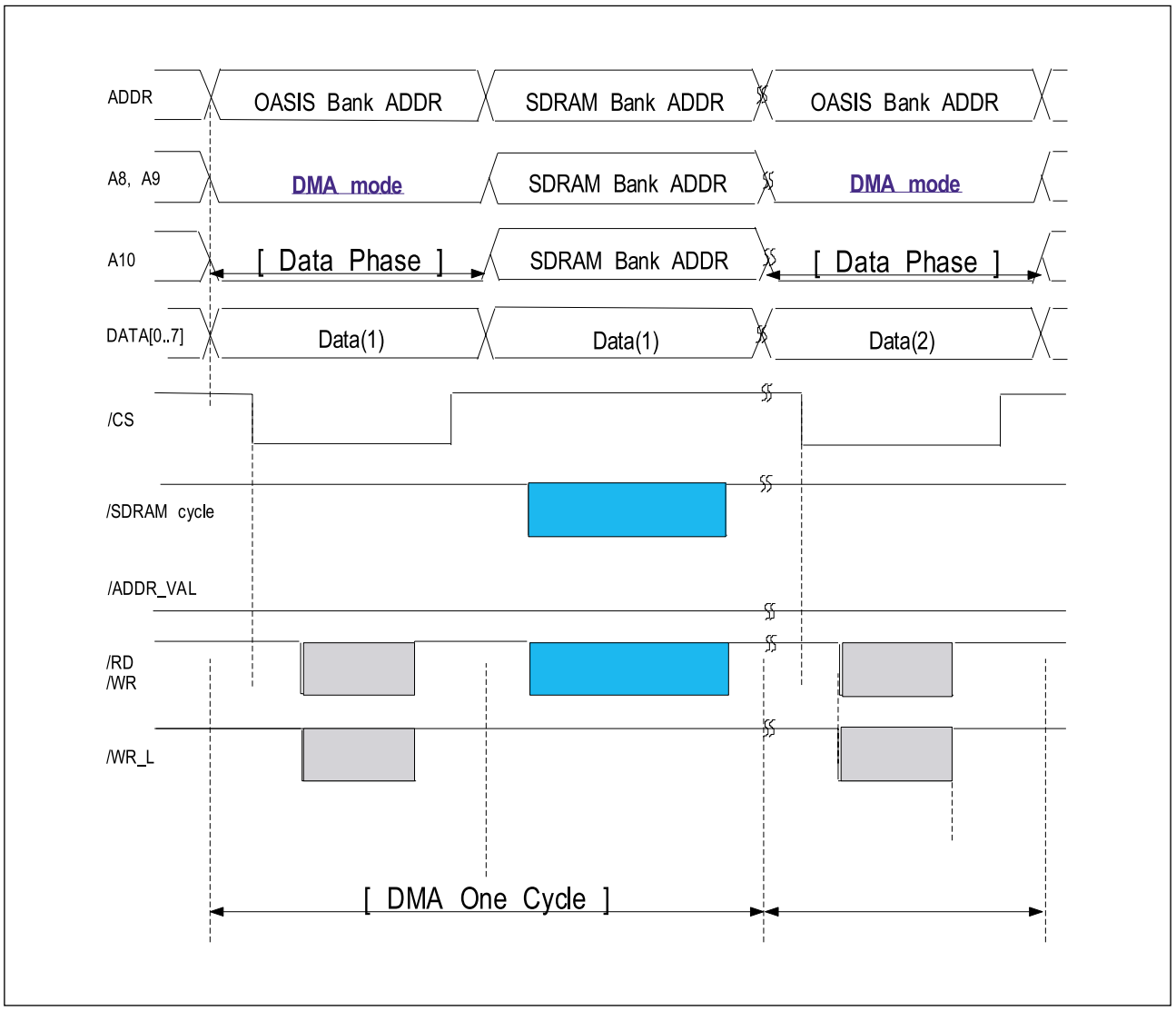
2. DMA mode

DMA mode is the method of Reading or Writing Data in Block unit by activating two DMA Channels of OA-980 respectively. When A8 or A9 is “Low” and when /IP_CS is “Low,” GDMA of Jupiter3 Reads or Writes in Memory to Memory mode, as the appropriate DMA Channel is activated. See Figure (17). Of course, it performs required DMA register setting in Multiplexed 8bit Bus(data & address) mode before DMA is accomplished.

3-5-2-4 Scanner Interface Section(PI)

It directly controls 16bit ADC and 600dpi color CIS connected to CIS, processes Shading and Gamma correction, the basic course required for Image process of RGB 12bit(8+4bit) data transferred from ADC, then performs the function of storing the data in SDRAM of OA-980 through MI Block.



<Figure 17. Hi Block Timing diagram(2)>

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3-5-2-5 Image Processing Section(IP)

After performing color compensating required for the System for RGB digital data input, it conducts the role of converting to CMYK data printable. IP Block consists of four Modules mainly.

- Photo text detect
- Zoom and dpi adjust
- Color space conversion
- Half toning and loss less JPEG

3-5-2-6 Memory Interface Section(MI)

MI Block consists of four Channels, located between external SDRAM(U2) and blocks inside OA-980, and is controlled so that the flow of all data may be accomplished more efficiently.

3-5-2-7 JBIG Comp & Decomp Section

By condensing Image data processed at Blocks into JBIG algorithm and save them in external SDRAM(U2), it shall have Memory domain used more efficiently. Naturally, even when moving Image data which was condensed to JBIG, to other block, it is conveyed to Image data freed from condensation.

3-5-2-8 Rotate and Inkjet Engine Section

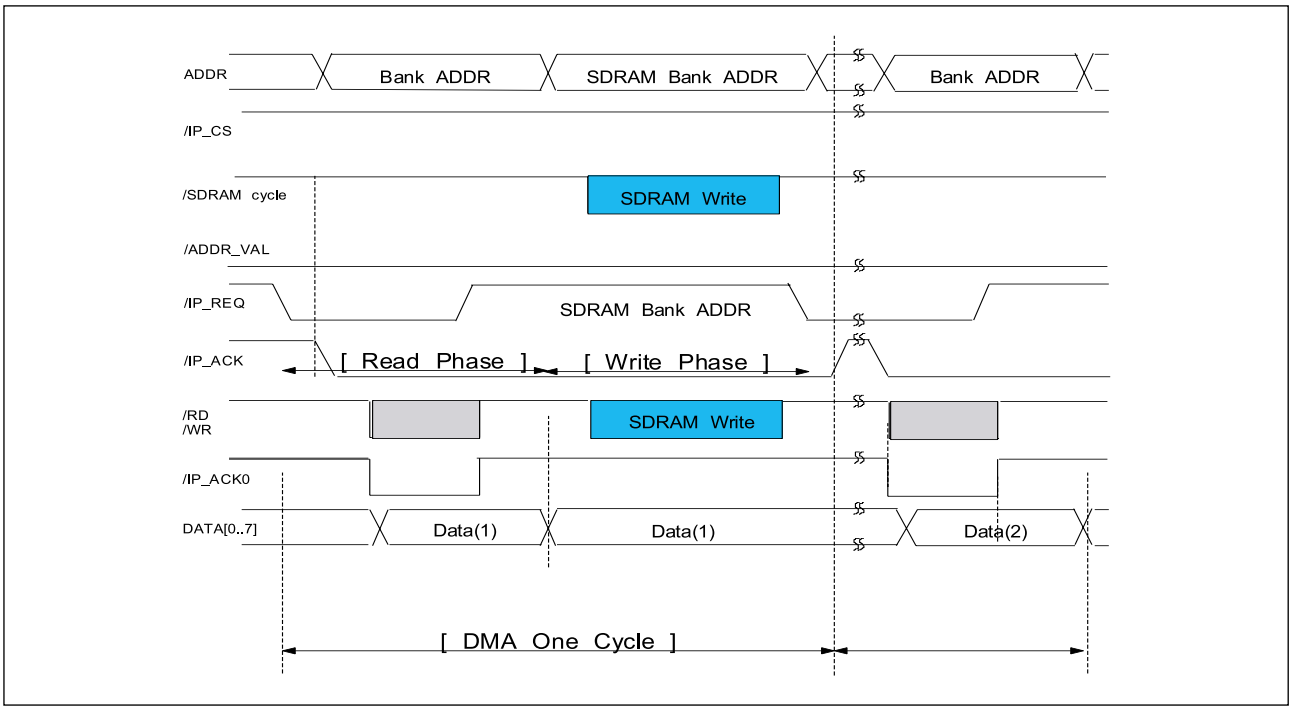
After Image CMYK Data which ended all image processing is converted to Format so that Inkjet Printer Engine may print, it plays the role of saving them on the external SDRAM(U2).

The Data stored in the external SDRAM(U2) is transferred to Head Control Part of Jupiter3 through MI and HI Block of OA-980 by DMA of Jupiter3, and then printed by Spitfire.

3-5-2-9 Printer Interface Section(PO)

When the Image process required for PC Scan (See Fig. 19) is completed, OA-980 requests that /IP_REQ signal in PO_Block should take the Scan Image Data from the External DMA Block of Jupiter3(U21). The External DMA Block of Jupiter3(U21) generates not only /IP_ACK signal to bring Data by Byte as the unit but also /RD signal to bring the Data. The External DMA Block of Jupiter3(U21) stores the Data in SDRAM(U9) and then restore /IP_ACK as "High" to receive a next Data/.

As DMA Timing properties between Jupiter and OA-980 do not match, /IP_ACK0 is separately created to prevent BUS collision by using one OR-Gate(U38-6) so that OA-980 may use the BUS only in /RD in the way of inputting the /ACK signal into OA-980 only when /RD is actually produced, while Jupiter3 may use in /WR, as shown in the Timing of Fig. 18. That is, since OA-980 sends Data to BUS during /ACK signal section, BUS collision occurs between DMA of Jupiter3 and /WR section, where /RD, /WR are all carried out during /ACK.



<Figure 18. PO Block DMA Timing Diagram>

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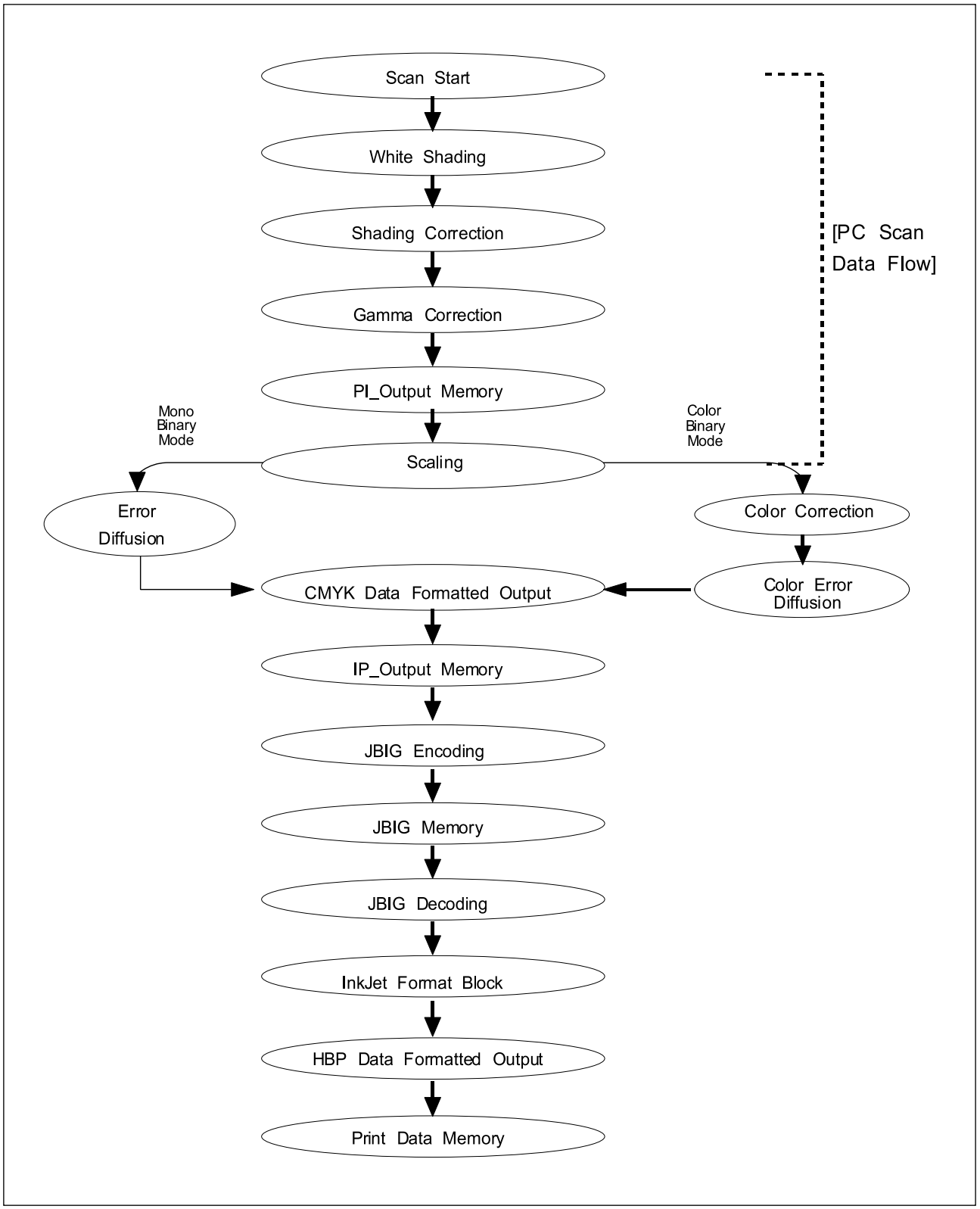
3-5-3 Copy Data Flow for OA-980



< Figure 19. PC Scan & Copy Data (OA-980) >

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3-5-4 OA-980 I/O PORT

PORT NAME	PIN NO	I/O	SIGNAL NAME	DESCRIPTION	
				H	L
GP_A0	190	I	RESERVERD (HOME)	(FB-HOME SENSOR DETECT)	
GP_A1	193	I	RESERVERD (REGI)	(FB-REGI SENSOR DETECT)	
GP_A2	194	I	RESERVERD (ADF)	(FB-ADF SENSOR DETECT)	
GP_A3	195	O	V0L_0	VOL_2 VOL_1 VOL_0 4051 MUX SELECT H H H VOLUME 7 : RING VOLUME MAX H H L VOLUME 6 : RING VOLUME H L H VOLUME 5 : RING VOLUME H L L VOLUME 4 : RING VOLUME MIN L H H VOLUME 3 : LINE MONITORING VOL MAX L H L VOLUME 2 : LINE MONITORING VOL L L H VOLUME 1 : LINE MONITORING VOL L L L VOLUME 0 : LINE MONITORING VOL MIN	
GP_A4	196	O	VOL_1		
GP_A5	197	O	VOL_2		
GP_A6	198	O	/SF_RST	SPITFIRE RESET OUT	
GP_A7	201	O	/MODEM_RST	MODEM RESET OFF: IDLE STATE (F/B - CF/PCMCIA RESET OUT)	
GP_B0	202	O	ADC_SDI	SIO DATA OUTPUT TO ADC	
GP_B1	203	O	ADC_SEN	ADC SIO ENABLE	ADC SIO DISABLE
GP_B2	204	O	ADC_SCK	SIO CLOCK OUTPUT TO ADC	
GP_B3	205	O	RESERVERD		
GP_B4	206	O	RESERVERD		
GP_B5	207	O	RESERVERD		
GP_B6	3	I	/D_DET	IDLE	D_DET ON
GP_B7	4	I	D_SCAN	D_SCAN ON	IDLE
GP_C0	5	O	FW RESERVERD	D_DET CHATTERING VALUE	
GP_C1	6	O	FW RESERVERD	D_SCAN CHATTERING VALUE	
GP_C2	7	O	RESERVED (ADF_PHA)	(F/B - ADF MOTOR PHASE A)	
GP_C3	8	O	RESERVED (ADF_PHB)	(F/B - ADF MOTOR PHASE B)	
GP_C4	9	O	RESERVED (ADF_IA0)	(F/B - ADF MOTOR CURRENT CONTROL A0)	
GP_C5	12	O	RESERVED (ADF_IA1)	(F/B - ADF MOTOR CURRENT CONTROL A1)	
GP_C6	13	O	RESERVED (ADF_IB0)	(F/B - ADF MOTOR CURRENT CONTROL B0)	
GP_C7	14	O	RESERVED (ADF_IB1)	(F/B - ADF MOTOR CURRENT CONTROL B1)	
GP_D0	80	O	TX_PHA	SCAN MOTOR PHASE A	
GP_D1	81	O	TX_PHB	SCAN MOTOR PHASE B	
GP_D2	82	O	TX_IA0	SCAN MOTOR CURRENT CONTROL A0	
GP_D3	83	O	TX_IA1	SCAN MOTOR CURRENT CONTROL A1	
GP_D4	84	O	TX_IB0	SCAN MOTOR CURRENT CONTROL B0	
GP_D5	85	O	TX_IB1	SCAN MOTOR CURRENT CONTROL B1	
PI_TGEN0	177	O	RLED	RLED ON	RLED OFF

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PORT NAME	PIN NO	I/O	SIGNAL NAME	DESCRIPTION	
				H	L
PI_TGEN1	176	O	GLED (CCD_CLK1)	GLED ON CCD CLK1	GLED OFF
PI_REQ_TGEN2	173	O	BLED (CCD_CLK2)	BLED ON CCD CLK2	BLED OFF
PI_ACK_TGEN3	172	O	CIS_CLK (CCD_RS)	CIS_CLK (F/B - CCD RS)	
PI_TGEN4	171	O	RESERVED (CCD_CP)	CCD CP	
PI_WR_TGEN5	170	O	ADC_CLK	ADC CLOCK	
PI_TGEN6	169	O	ADC_VSMP	ADC VIDEO SAMPLE CLOCK	
PI_TR_TGEN	168	O	CIS_SI (CCD_TG)	CIS_SI (F/B - CCD TG)	
PL_LINE_SYNC	167	B	RESERVED	-	
PL_DATA0	189	I	RESERVED (HOME)	(F/B - CCD HOME CHECK SIGNAL IN)	
PL_DATA1	188	-	RESERVED	-	
PL_DATA2	187	-	RESERVED	-	
PL_DATA3	186	-	RESERVED	-	
PL_DATA4	185	I	ADC_DATA6	ADC DATA BUS	
PL_DATA5	184	I	ADC_DATA7		
PL_DATA6	181	I	ADC_DATA8		
PL_DATA7	180	I	ADC_DATA9		
PL_DATA8	179	I	ADC_DATA10		
PL_DATA9	178	I	ADC_DATA11		
PO_WR	93	B	RESERVED		
PO_DONE	92	B	RESERVED		
PO_ACK	91	O	/IP_REQ	IDLE DMA REQ. for OA_980	DMA REQUEST TO JUPITER3
PO_REQ	90	I	/IP_ACK	IDLE DMA ACK. for OA-980	DMA ACK. FROM JUPITER3
PO_PAGE_SYNC	89	B	RESERVED	-	
PO_LINE_SYNC	86	B	RESERVED	-	
PO_DATA0	103	O	DATA0	DMA DATA BUS	
PO_DATA1	102	O	DATA1		
PO_DATA2	101	O	DATA2		
PO_DATA3	100	O	DATA3		
PO_DATA4	99	O	DATA4		
PO_DATA5	98	O	DATA5		
PO_DATA6	97	O	DATA6		
PO_DATA7	94	O	DATA7		

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3-6 CIS MODULE and ADC Part

3-6-1 Scanner

3-6-1-1 SUMMARY

This sheet-fed type device to read manuscripts has 600dpi CIS as an image sensor. The design is focused on 30-sheet ADF.

3-6-1-2 SCAN RESOLUTION

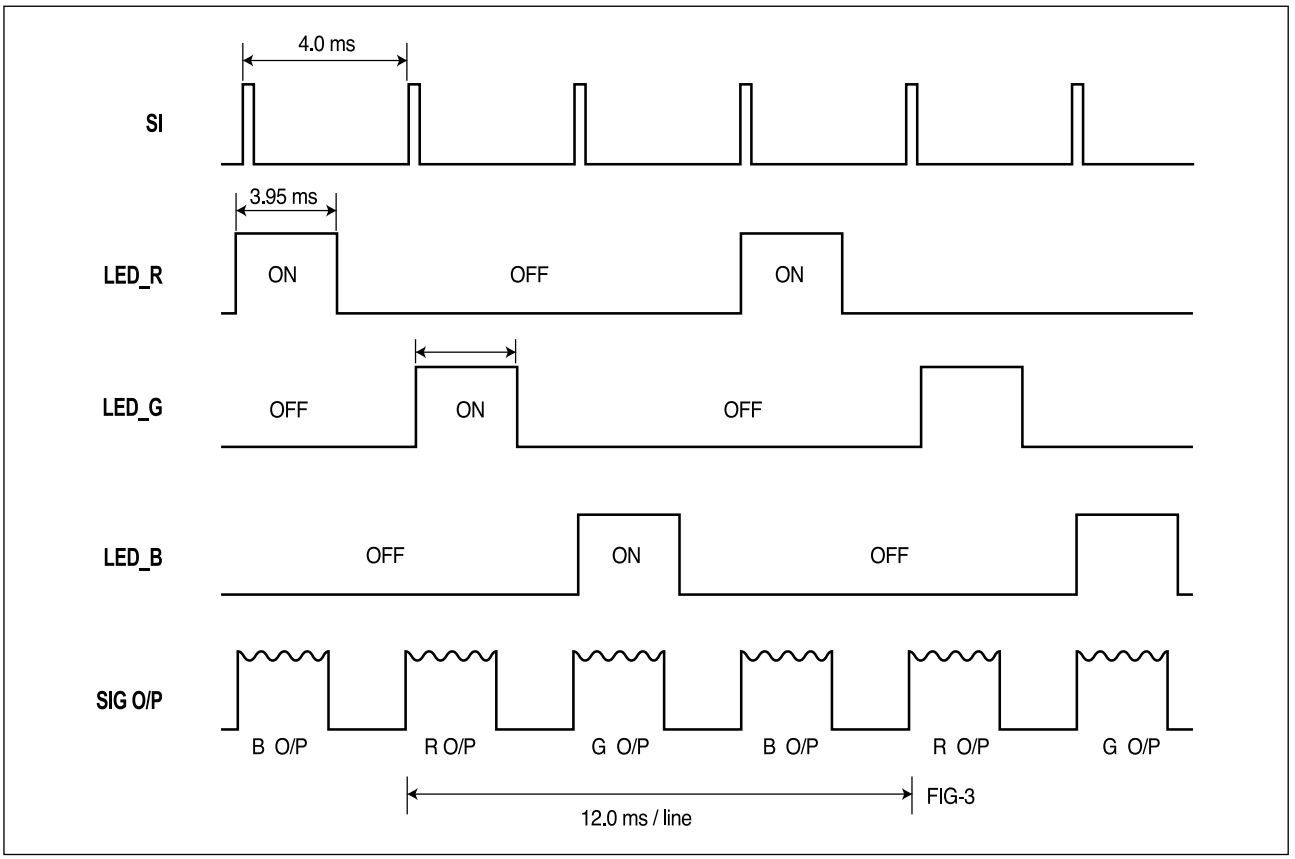
- Normal : 1/3.85mm, 1/8mm(98 X 203dpi)
- Fine : minor scanning 1/7/7mm, main scanning 1/8mm(196 X 203dpi)
- Super Fine : minor scanning 1/300inch, main scanning 1/300inch (300 X 300dpi)

3-6-1-3 CIS

Contact Image Sensor improves productivity and is designed to be replaced easily.

A4000 model uses color CIS.

- Minimum Scan Line Time for one color : 4ms
- Color Separation : RGB LED transfer mode
- Light Source Power : 5V
- Maximum Pixel frequency : 2MHz (Used for 1.56MHz)
- Effective Sensor Element : 5104
- Bright Output : 1.0 ~ 1.6V



< CIS Timing Chart >

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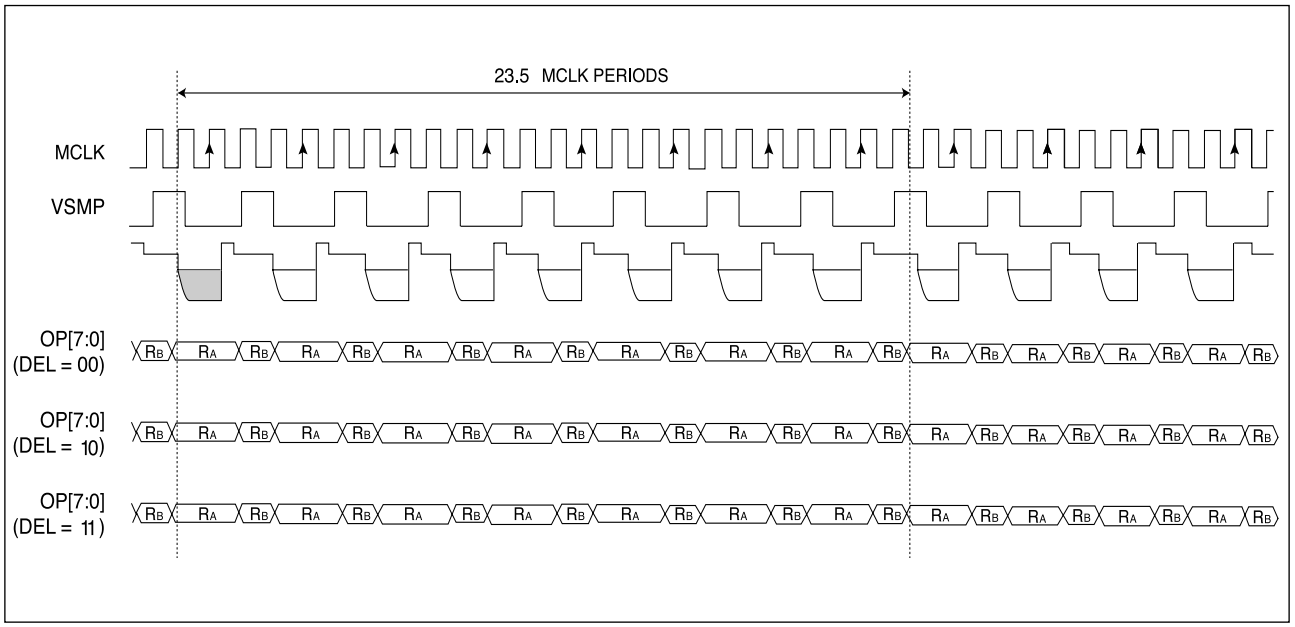
3-6-2 ADC

Description ADC(U1) is the input data that change the analog signal of RGB to the digital signal of 16bit (8bit + 8bit) so that it may be used as the input of OA-980(U13), image processor, while VSMP(_ADC_VSMP) is used as a sampling signal for each pixel of RGB. That is, it controls the signal for one pixel like CIS CLK and its maximum sampling rate is of color 2MHz mono 4MHz. MCLK(ADC_CLK) is CLK for the signal of VSMP, the relation between MCLK and VSMP is as follows.

	Color	Mono
VSMP	640ns(1.5625MHz)	640ns(1.5625MHz)
ADC_CLK	213ns(4.6875MHz)	213ns(4.6875MHz)
VSMP:MCLK	1 : 3	1 : 3

The relations among SCK(ADC_SCK), SDI(ADC_SDI) and SEN(ADC_SEN) are equivalent to the control bit for register setting to mode, output signal appears in 8bit unit from OP0 to OP7, and 5V/3.3V will be used as the power source.



<Figure 20. Color mode MCLK, VSMP>

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3-7 THUNDERBOLT ASIC description

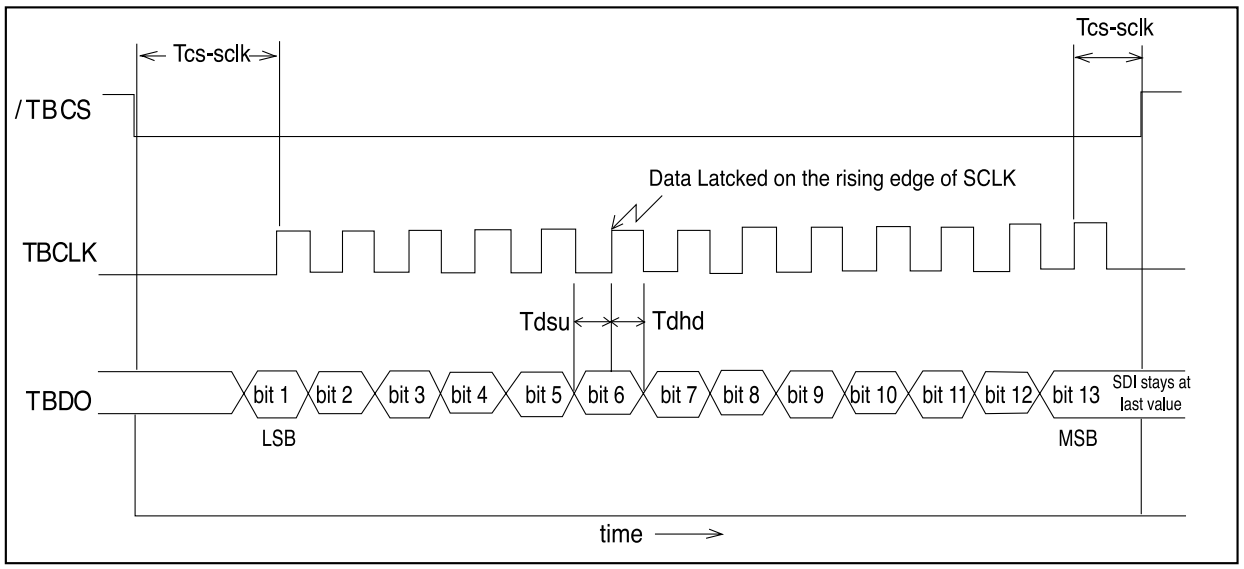
3-7-1 Entire description

THUNDERBOLT ASIC is configured with SERIAL INTERFACE INPUT PORT interfacing Main controller, 2 DC-DC Converter Controllers, Power On Reset Generation Circuit, and Motor drive part.

3-7-2 THUNDERBOLT FUNCTION DESCRIPTION

3-7-2-1 SERIAL INTERFACE INPUT PORT

To MAIN CONTROLLER(S3C46MOX(Jupiter3)), /TBCS,TBCLK,TBDO are connected with MAIN CONTROLLER (S3C46MOX (Jupiter3)), and see the figure for Timing.



< Figure 21. SERIAL INTERFACE INPUT Timing Diagram >

Parameter	Description	Min	Typ	Max	Units
Fclk	Serial clock frequency		2.5	4	MHz
Tclh	SCLK high width	125	200	-	nsec
Tcll	SCLK low width	125	200	-	nsec
Tcs-sclk	Delay nCS falling to first SCLK rising	250	800	-	nsec
Tsclk-cs	Delay last SCLK rising edge to nCS rising	250	400	-	nsec
Tdsu	Data valid to SCLK set up time	125	200	-	nsec
Tdhd	Data hold time	125	200	-	nsec
Trd	SDI rise time	5		20	nsec
Tfd	SDI fall time	5		20	nsec
Trc	SCLK rise time	5		20	nsec
Tfc	SCLK fall time	5		20	nsec

< Figure 21-1. SERIAL INTERFACE INPUT Timing Specification >

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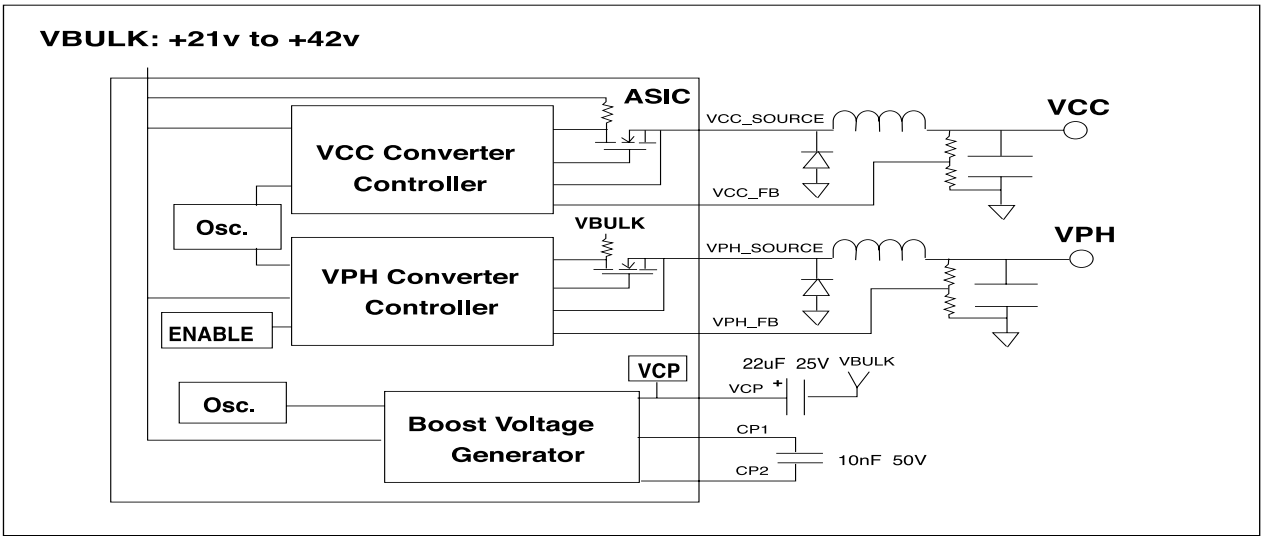
3-7-2-2 DC-DC Converter Controller

This System uses VCC by converting it to +5V, and +3.3V, the power source of the system, is obtained from the +5V converted by using REGULATOR IC to use. VPH is used as the head power by converting it to +11.82V.



< Figure 22. DC-DC Converter Controller Diagram>

3-7-2-3 Power On Reset Generation Circuit

This System does not use Power On Reset Generation Circuit.

3-7-2-4 Motor drive part

This System uses DC Motor for CR(Carriage Return) MOTOR, and Stepper motor for LF(Line Feed) motor.

• CR(Carriage Return) MOTOR drive circuit description

1 CR MOTOR specification

CR MOTOR performs reciprocating movement of CARRIAGE from side to side so that INK CARTRIDGE may print on the paper.

- MOTOR TYPE : PM DC MOTOR “declination”
- Drive voltage : +30VDC
- Winding line resistance : 12Ω ± 2Ω
- Driver IC : Thunderbolt

2. CR MOTOR drive

2-1. DC Motor operation

DC Motor drive uses positive phase terminal(+) and anti-phase terminal(-) bound together respectively using 2nd Motor Driver(MD2) of Thunderbolt ASIC inside, and controls two-way operation of DC motor, by receiving input of "DIR_DCM," 7th bit among "PWM"(DC-motor Pulse Width Modulation) signal, output of Jupiter-III, and 13Bit Serial Port Inputs("TBDO" Signal) coming into Thunderbolt ASIC transmitted from Jupiter-III. This Driver is driven by VBULK power source(+30V), and on terms of Motor Stall not being generated, it is designed to supply 750mA current, and 2.4A current to output terminal for maximum length of 100ms.

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2-2. Driver Spec.

1) Absolute Maximum Rating

Name	Description	Condition	Min	Max	Units
Vout	DC Motor Driver Output Voltage			42	Volts
Iout	DC Motor Driver Output Current			2.4	A

2) DC Specification

Name	Description	Condition	Min	Max	Units
I peak	Peak DC Motor Driver Output Current	Not Stalled		0.75A	Volts
I out	DC Motor Driver Sustaining Current	On Time=100ms	1.6	2.4	A

3) AC/Transient Specifications

Name	Description	Condition	Min	Nom	Max	Units
f_{PWM}	PWM frequency	Ta = 25C	19	20	21	KHz

4) Truth Table

DIR_DCM	PWM	#NAME?	#NAME?	#NAME?	#NAME?
0	0	On	Off	On	Off
0	1	Off	On	On	Off
1	0	On	Off	On	Off
1	1	Off	Off	Off	On

3. LF(Line Feed) MOTOR drive circuit description

LF MOTOR

- MOTOR TYPE : 2-2 Bi-polar Stepper Motor
- Drive Voltage : +30V
- Spherical line resistance : 5Ω ± 7%
- Driver IC : Thunderbolt

3-1. LF Motor Operation

LF Motor(Stepper Motor) drive utilizes first Motor Driver(MD1) in Thunderbolt ASIC, and Drive Pulse is displayed at 4 terminals of A+, A-, B+,and B-. two H letter type Drivers. Drive Pulse controls size and flow direction of current(A+ => A- or A- => A+) following bit7-bit No.13 signal among 13Bit Serial Port Inputs("TBDO" Signal) coming into Thunderbolt ASIC transmitted from Jupiter-III. This Driver is driven by VBULK power (+30V), and under terms of motor not stalling, it was designed to supply current of 600mA, maximum of 700mA current to the "table" of motor.

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3-2. Driver Spec.

1) Absolute Maximum Rating

Name	Description	Condition	Min	Max	Units
V out	DC Motor Driver Output Voltage			42	Volts
I out	DC Motor Driver Output Current			0.7	A

2) DC Specification

Name	Description	Condition	Min	Max	Units
I peak	Peak DC Motor Driver Output Current	Not Stalled		0.6A	Volts

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• OPE

3-8 Basic concept

3-8-1 Overview

OPE BOARD is separated from the Main Board functionally, and operates entire Micom(HT48C5A-000Z) in the Board. OPE and Main exchange mutual information using UART(universal asynchronous receiver/transmitter) channel. Also, Resetting of OPE is designed to control at the Main. Micom in OPE performs key-scanning and LCD, display control, and senses document detect, Scan position and so on. When information is generated from OPE(key touch, sensor level change, etc.), it sends specific code coping with the situation to Main, and the Main operates system by analyzing this code. If the Main tries to display data on OPE, the Main sends data to OPE via UART line on the basis of the format specified, and OPE displays it to LCD.

- The output of Sensor(D_Det, D_SCAN) is transferred directly to MAIN PBA (OASIS : U13-PIN 3, 4)

3-8-2 UART

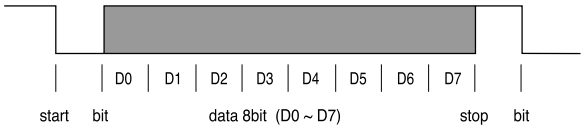
OPE and MAIN exchange information mutually by using asynchronous communication mode(UART), and in full duplex. Band rate is 9600bps, and uses 7.37MHz resonator as oscillating element. It engages in communication with 8bit data without parity bit. UART line has two lines for Tx and Rx, and the default level is in the 'high' state. For communication, the start bit(low level) is transmitted before 8bit data. When the data transmission(8bit) is completed, the high state is maintained as the stop bit(high level) is transmitted. Data is transmitted from LSB(DO), and MSB(D7) is transmitted lastly.

3-9 UART operation

3-9-1 UART communication

1) UART TX FORMAT

Codes for change of KEY, TOUCH, SENSOR LEVEL and so on are transmitted in single code without PRE/POST DATA, and OK or Error messages to check if communication is performed properly are also transmitted in single code. Provided that, in case the Main requested a certain value(LCD, other register) particularly, data requested is transmitted followed by sending Post Data('EOH') first.



2) UART RX FORMAT

Data being received will be arranged to be received according to the following specified format to know what data they are.

a)	Type of data received
b)	Number of data (n+1) received after.
c)	---------- DATA(N) ----------
d)	Check sum(1)

DATA are received in the sequence of A,B,C, and D, and the Check sum to check if the transmission is made properly will be found by doing XOR data from A to C.

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3-9-2 UART communication DATA

1) UART transmission DATA(received by the Main side)

Types	Status	DATA	used port	Level	Remarks
key data	ON	11H~ 88H	PORT PC0~PORT PC7	L	
	OFF	af H		H	
SCAN POSITION sensor	ON	a5 H	PORT PB3	H	A4000 not applied
	OFF	a4 H		L	
DOC. detector sensor	ON	a1 H	PORT PB-5	L	A4000 not applied
	OFF	a0 H		H	
For initial use of initial OPE		ee H			After power on, generated only once
UART communication	OK	b0 H			(Note 2)
	ERR	c0 H			
LCD interface of OPE	OK	df H			When failed in the interface once & when succeeded first(Note 2)
	ERR	d0 H			
Self initial generation of OPE		e2 H			LCD data keeps status quo
Send data requested by the Main		e0 H			Data types:LCD, other(Note 3)

(Note) 1. After this, keep waiting until there is response from the Main.

2. The case of longer time(longer than 10ms) elapsed longer than waiting time required for Interface is regarded as fail

3. After this code went out, then data requested it goes out.

• KEY MATRIX

	(1_H)	(2_H)	(3_H)	(4_H)	(5_H)	(6_H)	(7_H)	(8_H)
(_1H)	RESERVED	FAX	MENU	OPTION	RESERVED	RESERVED	RESERVED	RESERVED
(_2H)	RESERVED	COPY	SETUP	CANCEL/NO	RESERVED	RESERVED	RESERVED	RESERVED
(_3H)	RESERVED	SCAN	FORM_FD	RESERVED	RESERVED	RESERVED	RESERVED	RESERVED
(_4H)	RESERVED	CTRL_FD	PAUSE/REDIAL	START/YES	RESERVED	RESERVED	RESERVED	RESERVED
(_5H)	RESERVED	1	2	3	RESERVED	RESERVED	RESERVED	RESERVED
(_6H)	RESERVED	4	5	6	RESERVED	RESERVED	RESERVED	RESERVED
(_7H)	RESERVED	7	8	9	RESERVED	RESERVED	RESERVED	RESERVED
(_8H)	RESERVED	*	0	#	RESERVED	RESERVED	RESERVED	RESERVED

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2) Received DATA(transmitted by MAIN)

1. DATA TYPE

DATA types	Meaning	Remarks
a1 H	LCD DISPLAY DATA(FULL LINE)	
a2 H	LCD DISPLAY DATA(1'ST LINE)	
a3 H	LCD DISPLAY DATA(2'ST LINE)	
a4 H	LED DATA	A4000 not applied
b1 H	Change of LCD types	

2. NO. OF DATA

• In case DATA is N BYTE, N+1

3. DATA

In case DATA TYPE is LCD DATA, it is configured with ASCII CODE to be displayed.
In case DATA TYPE is LED DATA, it is 1 BYTE.

LED DATA BIT ASSIGNMENT:

DATA BIT	BIT 0	BIT 1	BIT 2	BIT 3	BIT 4	BIT 5	BIT 6	BIT 7
LED NO.	LED 0	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7

4. CHECK SUM

The value done XOR all of them from DATA TYPE to DATA.

5. Change of LCD types

<2 LINE * Change to 16 character LCD>

DATA TYPE : b1 H
NO. OF DATA : 2
DATA : 26 H
CHECK SUM : b1h XOR 2 XOR 16h = a5 h

<1 LINE * Change to 16 character LCD>

DATA TYPE : b1 H
NO. OF DATA : 2
DATA : 26 H
CHECK SUM : b1h XOR 2 XOR 26h = 95 h
DEFAULT : 2 LINE 16 Character LCD

In case the MAIN does not change the LCD types, it is the Default LCD state of OPE MICOM.

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3-10 I/O PORT configuration and use usage

It has 32 I/O Ports, and 24 Ports of them are arranged to decide I/O direction with Software Control, and the rest 8 Ports are arranged to be used for Input or Output only. All of I/O Ports are classified into four Blocks according to the characteristics of I/O Control, and each Block consists of 8 Ports.

Type	I/O Control	I/O direction	USE	Remarks
PA X	Byte Control	I/O => Output	LED Control	A4000 not applied
PB X	Byte Control	In : 4, Out : 4	UART, LCD	
PC X	Byte Control	I/O => Input	Key Input	
PD X	Byte Control	I/O => Output	LCD Data, Key Scan	

1) Assignment of Port PAX

-. PA0 : RESERVED
-. PA1 : RESERVED
-. PA2 : RESERVED
-. PA3 : RESERVED
-. PA4 : RESERVED
-. PA5 : RESERVED
-. PA6 : RESERVED
-. PA7 : RESERVED

2) Assignment of port PBX

-. PB0(Output) : LCD Enable
-. PB1(Output) : LCD R/W
-. PB2(Output) : LCD RS
-. PB3(Input) : GND
-. PB4(Input) : Unused (Pull-up)
-. PB5(Input) : GND
-. PB6(Output) : UART TXD in Main UART
-. PB7(Input) : UART RXD from Main UART

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3-11 FAX Transceiver

3-11-1. GENERAL

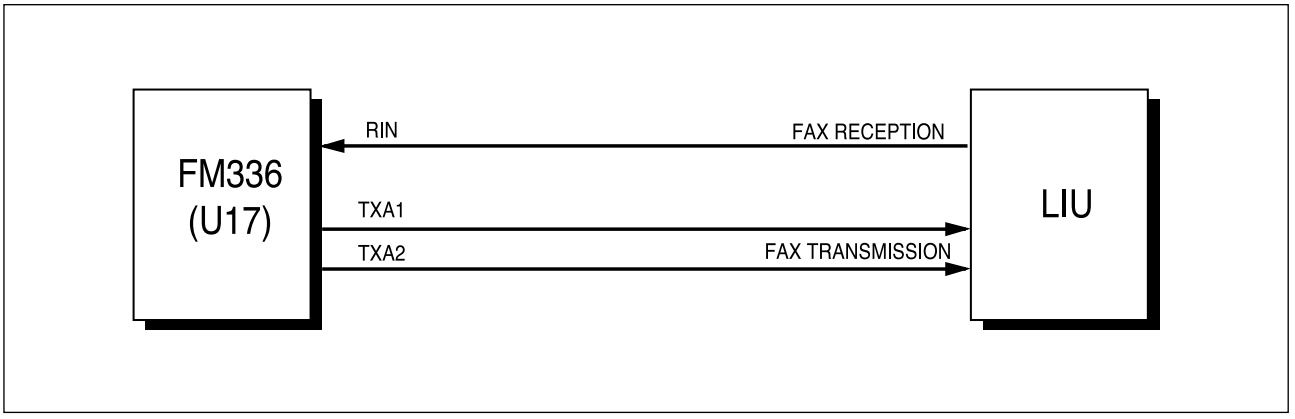
This circuit processes transmission signals of modemand between LIU and modem.

3-11-2. MODEM(U17)

The Conexant FM336 FAX modem is a V.34 half-duplex modem that supports Group 3facsimile send and receive speeds up to 33600bps. using the V.34 half-duplex mode.Using a V.34 technique to optimize modem configuration for line conditions, the modem connects at the optimal selected data rate that the channel can support from 33600bps to 2400bps. TXA1, TXA2 are transmission output ports are received data input port. /POR signal controlled by MFP controller (U 21 : S3C46MOX) can initialize modem(/M_RST) without turning off the system.D0¡–D7 are 8-bit data buses. RS0¡–RS4 signals to select the register in modem decide the mode. /CS is a signal to select modem chips. /RD and /WR signalscontrol READ and WRITE respectively. /IRQ is a signalfor modem interrupt.

3-11-3. TRANSMITTER

This circuit processes transmission output, analog signalof modem(FM336).Output signal in each mode goes out of modem(TXA1:U17-29, TXA2:U17-28). They are put out to LINE through LIU board.. RECEIVERIn the receiving mode, analog signals coming inthrough LIU board, and then transmitted to input terminal of modem (RIN:U17-32)



< Fax Transceiver >

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3-11-4. FM336 FEATURES

- 2-wire half
  - duplex fax modem modes with send and receive data rates up to 33600 bps.
  - V.34, V.17, V.29, V.27 ter, and V.21 channel 2
  - Short train option in V.17 and V.27 ter
- 2-wire full
  - duplex data modem modes
  - V.21, V.23 (75 bps TX/1200 bps RX or 1200 bps TX/ 75 bps RX)
- PSTN session starting
  - V.8 signaling
- HDLC support at all speeds
  - Flag generation, 0 bit stuffing, ITU CRC
  - 16 or CRC
  - 32 calculation and generation
  - Flag detection, 0 bit deletion, ITU CRC
  - 16 or CRC
  - 32 check sum error detection
  - FSK flag pattern detection during high speed receiving
- Tone modes and features
  - Programmable single or dual tone generation
  - DTMF receive
  - Tone detection with three programmable tone detectors
- Serial synchronous data
- Parallel synchronous data
- Automatic Rate Adaptation (ARA) in V.34 Half-Duplex
- TTL and CMOS compatible DTE interface
  - ITU-T V.24 (EIA/TIA-232-E) (data/control)
  - Microprocessor bus (data/configuration/control)
- Receive dynamic range: 0 dBm to –43 dBm for V.17, V.33, V.29, V.27terand V.21, –9 dBm to –43 dBm for V.34 half-duplex
- Programmable RLSD turn-on and turn-off thresholds
- Programmable transmit level: 0 to -15 dBm
- Adjustable speaker output to monitor received signal
- DMA support interrupt lines
- Two 16-byte FIFO data buffers for burst data transfer with extension up to 255 bytes
- NRZI encoding/decoding
- Diagnostic capability
- +3.3V operation with +5V tolerant inputs
- +5V analog signal interface
- Typical power consumption:- Sleep mode: 20 mW
  - Normal mode: 250 mWa
- 100-pin PQFP package

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3-11-5. Signaling Rates, and Data Rates

Configuration	Modulation1	Carrier Frequency (Hz) ±0.01%	Data Rate (bps) ±0.01%	Symbol Rate (Symbols/Sec.)	Bits/Symbol - Data	Bits/Symbol - TCM	Constellation Points
V.34 33600 TCM	TCM	Note 2	33600	3429 only	Note 2	Note 2	Note 2
V.34 31200 TCM	TCM	Note 2	31200	3200 min	Note 2	Note 2	Note 2
V.34 28800 TCM	TCM	Note 2	28800	3000 min	Note 2	Note 2	Note 2
V.34 26400 TCM	TCM	Note 2	26400	2800 min	Note 2	Note 2	Note 2
V.34 24000 TCM	TCM	Note 2	24000	2800 min	Note 2	Note 2	Note 2
V.34 21600 TCM	TCM	Note 2	21600	2400 min	Note 2	Note 2	Note 2
V.34 19200 TCM	TCM	Note 2	19200	2400 to 3429	Note 2	Note 2	Note 2
V.34 16800 TCM	TCM	Note 2	16800	2400 to 3429	Note 2	Note 2	Note 2
V.34 14400 TCM	TCM	Note 2	14400	2400 to 3429	Note 2	Note 2	Note 2
V.34 12000 TCM	TCM	Note 2	12000	2400 to 3429	Note 2	Note 2	Note 2
V.34 9600 TCM	TCM	Note 2	9600	2400 to 3429	Note 2	Note 2	Note 2
V.34 7200 TCM	TCM	Note 2	7200	2400 to 3429	Note 2	Note 2	Note 2
V.34 4800 TCM	TCM	Note 2	4800	2400 to 3429	Note 2	Note 2	Note 2
V.34 2400 TCM	TCM	Note 2	2400	2400 only	Note 2	Note 2	Note 2
V.23 1200/75	FSK	1700/420	1200/75	1200	1	0	—
V.21	FSK	1080/1750	Up to300	300	1	0	—
V.17 14400 TCM	TCM	1800	14400	2400	6	1	128
V.17 12000 TCM	TCM	1800	12000	2400	5	1	64
V.17 9600 TCM	TCM	1800	9600	2400	4	1	32
V.17 7200 TCM	TCM	1800	7200	2400	3	1	16
V.29 9600	QAM	1700	9600	2400	4	0	16
V.29 7200	QAM	1700	7200	2400	3	0	8
V.29 4800	QAM	1700	4800	2400	2	0	4
V.27 ter 4800	DPSK	1800	4800	1600	3	0	8
V.27 ter 2400	DPSK	1800	2400	1200	2	0	4
V.21 Channel 2	FSK	1750	300	300	1	0	—

Notes:

1. Modulation legend: TCM:Trellis-Coded Modulation QAM: Quadrature Amplitude Modulation
   FSK:Frequency Shift Keying DPSK: Differential Phase Shift Keying
2. Adaptive; established during handshake:

	Carrier Frequency (Hz)	
Symbol Rate (Baud)	V.34 Low Carrier	V.34 High Carrier
2400	1600	1800
2800	1680	1867
3000	1800	2000
3200	1829	1920
3429	1959	1959

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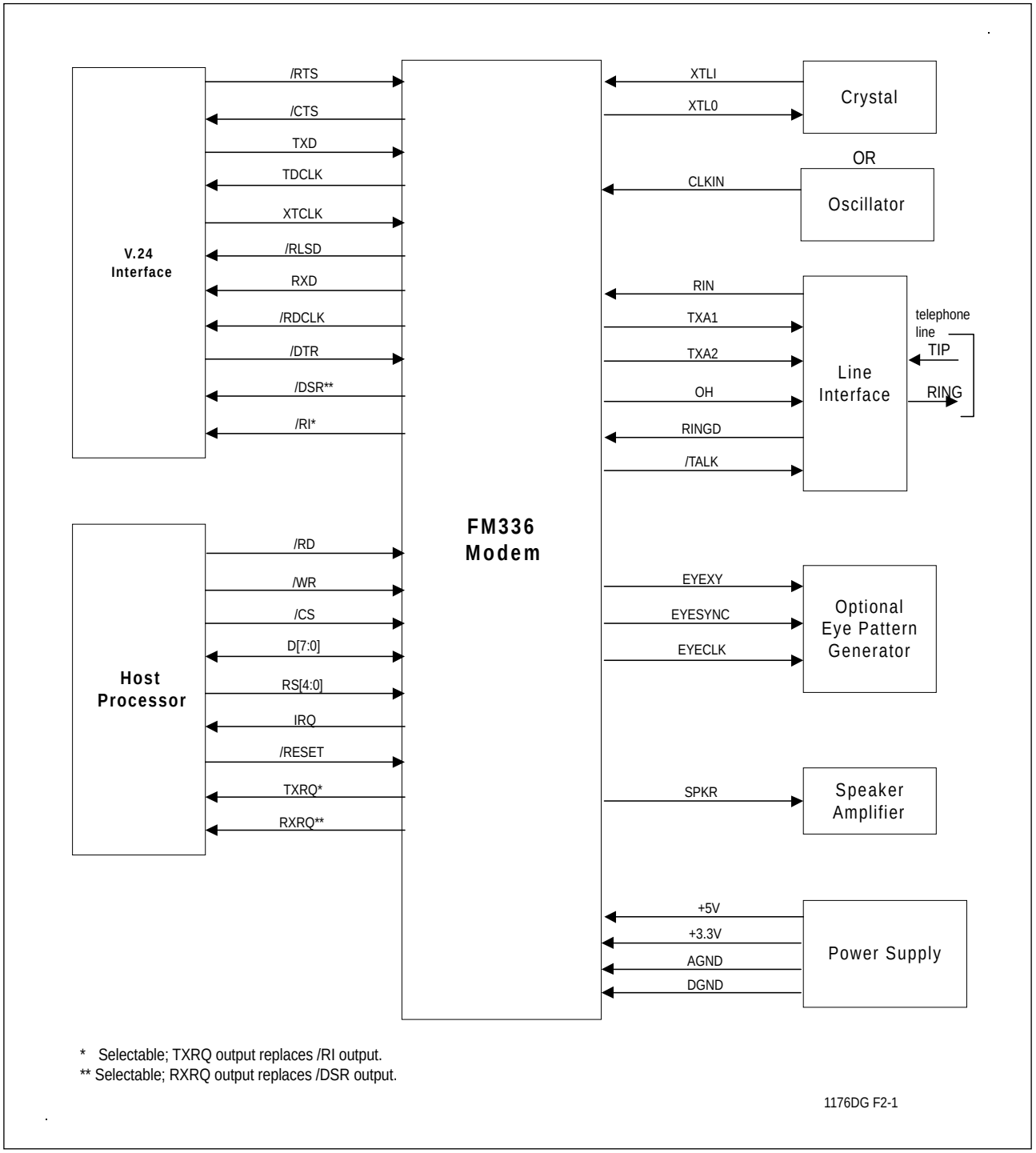
3-11-6. Modem Functions Interface Signals



* Selectable; TXRQ output replaces /RI output.
** Selectable; RXRQ output replaces /DSR output.

1176DG F2-1

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3-11-7. FM336 Pin Signals

Pin	Signal Label	I/O Type 1	Interface 3	Pin	Signal Label	I/O Type 1	Interface 3
1	RESERVED	-	-	51	RESERVED	-	-
2	RS2	IA	HOST Interface	52	VSUB	GND	-
3	RS3	IA	HOST Interface	53	VSS	GND	-
4	RS4	IA	HOST Interface	54	NC	-	NC
5	/CS	IA	HOST Interface	55	NC	-	NC
6	/WR	IA	HOST Interface	56	Sleep	MI	Modem Interconnect
7	/RD	IA	HOST Interface	57	VDD1	PWR	-
8	/RDCLK	OA	DTE Serial Interface	58	RESERVED	-	-
9	/RLSD	OA	DTE Serial Interface	59	RESERVED	-	-
10	TDCLK	OA	DTE Serial Interface	60	NC	-	NC
11	TXD	IA	DTE Serial Interface	61	SR1IO	MI	Modem Interconnect
12	/CTS	OA	DTE Serial Interface	62	VCORE	PWR	-
13	VDD1	PWR	-	63	VDD1	PWR	-
14	RESERVED	-	-	64	XTCLK	IA	DTE Serial Interface
15	RESERVED	-	-	65	VSS	GND	-
16	VSS	GND	-	66	RESERVED	-	-
17	NC	-	NC	67	RXD	OA	DTE Serial Interface
18	/RESET	OA	Modem Interconnect	68	/DTR	IA	DTE Serial Interface
19	SR4OUT	OA	Modem Interconnect	69	VDD1	PWR	-
20	NC	-	NC	70	IA_SLEEP	MI	Modem Interconnect
21	SR4IN	IA	Modem Interconnect	71	VGG	PWR	-
22	CLK_OUT	OA	Modem Interconnect	72	YCLK	OA	Overhead Signal
23	EYESYNC	OA	Diagnostic Signal	73	XCLK	OA	Overhead Signal
24	EYECLK	OA	Diagnostic Signal	74	EYEXY	OA	Diagnostic Signal
25	MAVSS	GND	-	75	/DSR	OA	DTE Serial Interface
26	MAVDD	PWR	-	76	/RI	OA	Telephone Line Interface
27	SPKR	O(DF)	Telephone Line Interface	77	RINGD	IA	Telephone Line Interface
28	TXA2	O(DD)	Telephone Line Interface	78	/RTS	IA	DTE Serial Interface
29	TXA1	O(DD)	Telephone Line Interface	79	IRQ	OA	HOST Interface
30	VREF	MI	Modem Interconnect	80	VSS	GND	-
31	VC	MI	Modem Interconnect	81	GPO0	MI	Modem Interconnect
32	RIN	I(DA)	Telephone Line Interface	82	RESERVED	-	-
33	MAVSS	AGND	-	83	RESERVED	-	-
34	/POR	IA	Modem Interconnect	84	VDD1	PWR	-
35	RESERVED	-	-	85	XTALI/CLKIN	I	Overhead Signal
36	RESERVED	-	-	86	XTALO	O	Overhead Signal
37	/TALK	O(DD)	Telephone Line Interface	87	D0	IA/OB	HOST Interface
38	VDD	PWR	-	88	D1	IA/OB	HOST Interface
39	RESERVED	-	-	89	D2	IA/OB	HOST Interface
40	RESERVED	-	-	90	D3	IA/OB	HOST Interface
41	NC	-	NC	91	D4	IA/OB	HOST Interface
42	M_CNTRL_SIN	IA	Modem Interconnect	92	VDD1	PWR	-
43	M_CLKIN	IA	Modem Interconnect	93	D5	IA/OB	HOST Interface
44	M_TXSIN	IA	Modem Interconnect	94	D6	IA/OB	HOST Interface
45	M_SCK	IA	Modem Interconnect	95	D7	IA/OB	HOST Interface
46	M_RXOUT	IA	Modem Interconnect	96	RS0	IA/OB	HOST Interface
47	M_STROBE	IA	Modem Interconnect	97	RS1	IA/OB	HOST Interface
48	RESERVED	-	-	98	PLL_VDD	PWR	-
49	OH	O(DD)	Telephone Line Interface	99	VSS	GND	-
50	VDD	PWR	-	100	PLL_GND	GND	-

Notes:

1. I/O types:
   - MI = Modem interconnect.
   - IA, IB = Digital input.
   - OA, OB = Digital output.
   - I(DA) = Analog input.
   - O(DD), O(DF) = Analog output.
2. NC = No external connection required.
   RESERVED = No external connection allowed.
3. Interface Legend:
   - HOST = Modem Control Unit (Host)
   - DTE = Data Terminal Equipment

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3-11-8. FM336 Signals Definitions

Label	I/O Type	Signal Name/Description
TELEPHONE LINE INTERFACE/AUXILIARY		
TXA1, TXA2	O(DD)	Transmit Analog 1 and 2. The TXA1 and TXA2 outputs are differential outputs 180 degrees out of phase with each other. Each output can drive a 300‰load.
RIN	O(DA)	Receive Analog. RIN is a single-ended receive data input from the telephone line interface or an optional external hybrid circuit.
RINGD	IA	Ring Detect. The RINGD input is monitored for pulses in the range of 15 Hz to 68 Hz. The frequency detection range may be changed by the host in DSP RAM. The circuit driving RINGD should be a 4N35 optoisolator or equivalent. The circuit driving RINGD should not respond to momentary bursts of ringing less than 125 ms in duration, or less than 40 VRMS (15 Hz to 68 Hz) across TIP and RING. Detected ring signals are reflected on the /RI output signal as well as the RI bit.
/TALK	O(DD)	Relay B Control. The /TALK open collector output can directly drive a +5V reed relay coil with a minimum resistance of 360 ohms (13.9 mA max. @ 5.0V) and a must-operate voltage no greater than 4.0 VDC. A clamp diode, such as a 1N4148, should be installed across the relay coil. An external transistor can be used to drive heavier loads (electro-mechanical relays). /TALK is controlled by host setting/resetting of the RB bit. In a typical application, /TALK is connected to the normally closed Talk/Data relay (/TALK). In this case, /TALK active opens the relay to disconnect the handset from the telephone line.
OH	O(DD)	Relay A Control. The OH open collector output can directly drive a +5V reed relay coil with a minimum resistance of 360 ohms (13.9 mA max. @ 5.0V) and a must-operate voltage no greater than 4.0 VDC. A clamp diode, such as a 1N4148, should be installed across the relay coil. An external transistor can be used to drive heavier loads (electro-mechanical relays). OH is controlled by host setting/resetting of the RA bit. In a typical application, OH is connected to the normally open Off-Hook relay (OHRC). In this case, OH active closes the relay to connect the modem to the telephone line. Alternatively, in a typical application, OH is connected to the normally open Caller ID relay (CALLID). When the modem detects a Calling Number Delivery (CND) message, the OH output is asserted to close the CALLID relay in order to AC couple the CND information to the modem RIN input (without closing the off-hook relay and allowing loop current flow which would indicate an off-hook condition).
/RI	OA	Ring Indicator. /RI output follows the ringing signal present on the line with a low level (0 V) during the ON time, and a high level (+3.3 V) during the OFF time coincident with the ringing signal. The RI status bit reflects the state of the /RI output.
DIAGNOSTIC SIGNALS		
		Three signals provide the timing and data necessary to create an oscilloscope quadrature eye pattern. The eye pattern is a display of received baseband constellation. By observing this constellation, common line disturbances can usually be identified.
EYEXY	OA	**Serial Eye Pattern X/Y Output.** EYEXY is a serial output containing two 11-bit diagnostic words (EYEX and EYEY) for display on the oscilloscope X axis (EYEX) and Y axis (EYEY). EYEX is the first word clocked out; EYEY follows. Each word has 8-bits of significance. EYEXY is clocked by the rising edge of EYECLK. This serial digital data must be converted to parallel digital form by a serial-to-parallel converter, and then to analog form by two digital-to-analog (D/A) converters.
EYECLK	OA	**Serial Eye Pattern Clock.** EYECLK is a 336 kHz output clock for use by the serial-to-parallel converters. The low-to-high transitions of RDCLK coincide with the low-to-high transitions of EYECLK. EYECLK, therefore, can be used as a receiver multiplexer clock.
EYESYNC	OA	**Serial Eye Pattern Strobe.** EYESYNC is a strobe for loading the D/A converters.
SPEAKER INTERFACE		
SPKR	O(DF)	**Speaker Analog Output.** The SPKR output reflects the received analog input signal. The SPKR on/off and three levels of attenuation are controlled by bits in DSP RAM. When the speaker is turned off, the SPKR output is clamped to the voltage at the VC pin. The SPKR output can drive an impedance as low as 300 ohms. In a typical application, the SPKR output is an input to an external LM386 audio power amplifier.

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FM336 Signals Definitions (Cont'd)

Label	I/O Type	Signal Name/Description
REFERENCE SIGNALS AND MODEM INTERCONNECT		
VC	MI	**Low Voltage Reference.** Connect to analog ground through 10 µF (polarized, + terminal to VC) and 0.1 µF (ceramic) in parallel.
VREF	MI	**High Voltage Reference.** Connect to VC through 10 µF (polarized, + terminal to VREF) and 0.1 µF (ceramic) in parallel.
/POR	IA	**Power-On-Reset.** Connects to /RESET.
/RESET	OA	**Reset.** Connects to /POR.
CLK_OUT	MI	**IA Clock.** Connect to M_CLKIN.
SR4OUT	OA	**SR4OUT.** Connect to M_TXSIN.
SR4IN	IA	**SR4IN.** Connect to M_RXOUT.
SR1IO	OA	**SR1IO.** Connect to M_CNTRL_SIN.
M_CNTRL_SIN	IA	**M_CNTRL_SIN.** Connect to SR1IO.
M_CLKIN	IA	**M_CLKIN.** Connect to CLK_OUT.
M_TXSIN	IA	**M_TXSIN.** Connect to SR4OUT.
M_SCK	IA	**M_SCK.** Connect to EYECLK.
M_RXOUT	IA	**M_RXOUT.** Connect to SR4IN.
M_STROBE	IA	**M_STROBE.** Connect to EYESYNC.
SLEEP	MI	**SLEEP.** Connect to IA_SLEEP.
IA_SLEEP	MI	**IA_SLEEP.** Connect to SLEEP
GPO0	MI	**GPO0.** Connect to /RDCLK.
DTE SERIAL INTERFACE		
/RDCLK	OA	**Receive Data Clock.** The modem outputs a synchronous Receive Data Clock (/RDCLK) for USRT timing. The /RDCLK frequency is the data rate (±0.01%) with a duty cycle of 50 ±1%. The /RDCLK low-to-high transitions coincide with the center of the received data bits.
/RLSD	OA	**Received Line Signal Detector.** For V.17, V.33, V.29, and V.27 ter; RLSD goes active at the end of the training sequence. If energy is above the turn-on threshold and training is not detected, the /RLSD off-to-on response time is 816 baud times for V.17/V.33, V.29, and V.27 ter long train; 492 baud times for V.17/V.33; and 486 baud times for V.27 ter short train. The /RLSD on-to-off time is 40 ± 5 ms for V.17/V.33, 35 ± 5 ms for V.29 or 11.6 ± 5 ms for V.27 ter. The /RLSD on-to-off time ensures that all valid data bits have appeared on RXD. The /RLSD programmable threshold levels default to –43 dBm for off-to-on and to –48 dBm for on-to-off. A minimum hysteresis of 2 dBm exists between the actual off-to-on and on-to-off transition levels. The threshold level and hysteresis are measured with an unmodulated 2100 Hz tone applied to the Receiver Analog (RXA) input. **Note:** Performance may be degraded when the received signal level is less than –43 dBm.
TDCLK	OA	**Data Clock.** The modem outputs a synchronous Data Clock (DCLK) for USRT timing. The DCLK frequency is the data rate (±0.01%) with a duty cycle of 50 ±1%. The DCLK low-to-high transitions coincide with the center of the data bits. Transmit Data (TXD) must be stable during the one microsecond period immediately preceding the rising edge of DCLK and following the rising edge of DCLK.
TXD	IA	**Transmit Data.** The modem obtains serial data to be transmitted from the local DTE on the Transmit Data (TXD) input in serial data mode (TPDM bit = 0), or from the interface memory Transmit Data Register (TBUFFER) in parallel data mode (TPDM bit = 1).

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FM336 Signals Definitions (Cont'd)

<table>
<tr><th>Label</th><th>I/O Type</th><th>Signal Name/Description</th></tr>
<tr><td>/CTS</td><td>OA</td><td>Clear To Send. /CTS active indicates to the local DTE that the modem will transmit any data present on TXD. /CTS response times from an active condition of /RTS are shown in Table 1-3.</td></tr>
<tr><td>XTCLK</td><td>IA</td><td>External Transmit Clock. In synchronous communication, an external transmit data clock can be connected to the modem XTCLK input. The clock supplied at XTCLK must exhibit the same characteristics as TDCLK. The XTCLK input is then reflected at the TDCLK output.</td></tr>
<tr><td>RXD</td><td>OA</td><td>Received Data. The modem presents received serial data to the local DTE on the Received Data (RXD) output and to the interface memory Receive Data Register (DBUFFER) in parallel data mode.</td></tr>
<tr><td>/DTR</td><td>IA</td><td>Data Terminal Ready. In V.8 and V.34 configuration, activating /DTR initiates the handshake sequence. The DATA bit must be set to complete the handshake.
In V.21 or V.23 configuration, activating /DTR causes the modem to enter the data state provided that the DATA bit is a 1. If in answer mode, the modem immediately sends answer tone. During the data mode, deactivating /DTR causes the transmitter and receiver to turn off and return to the idle state.
The /DTR input and the /DTR control bit are logically ORed.</td></tr>
<tr><td>/DSR</td><td>OA</td><td>Data Set Ready. DSR ON indicates that the modem is in the data transfer state. DSR OFF indicates that the DTE is to disregard all signals appearing on the interchange circuits except Ring Indicator (/RI). /DSR is OFF when the modem is in a test mode (local analog or remote digital loopback). The /DSR status bit reflects the state of the /DSR output.</td></tr>
<tr><td>/RTS</td><td>IA</td><td>Request to Send. The active low /RTS input allows the modem to transmit data present at TXD in the serial data mode (TPDM bit = 0), or in DBUFFER in the parallel data mode (TPDM bit = 1), when /CTS becomes active.
The /RTS hardware control input is logically ORed with the /RTSP bit by the modem to form the resultant control signal.</td></tr>
<tr><td colspan="3">HOST INTERFACE</td></tr>
<tr><td>/CS</td><td>IA</td><td>Chip Select. The active low /CS input selects and enables the modem DSP for parallel data transfer between the DSP and the host over the microprocessor bus.</td></tr>
<tr><td>/WR</td><td>IA</td><td>Write. Writing is controlled by the host pulsing /WR input low during the microprocessor bus access cycle. The write timing is:
<table>
<tr><th>Parameter</th><th>Symbol</th><th>Min.</th><th>Max.</th><th>Units</th></tr>
<tr><td>CS Setup Time</td><td>TCS</td><td>0</td><td>–</td><td>ns</td></tr>
<tr><td>RSi Setup Time</td><td>TRS</td><td>10</td><td>–</td><td>ns</td></tr>
<tr><td>Control Hold Time</td><td>THC</td><td>10</td><td>–</td><td>ns</td></tr>
<tr><td>Write Data Setup Time</td><td>TWDS</td><td>20</td><td>–</td><td>ns</td></tr>
<tr><td>Write Data Hold Time</td><td>TDHW</td><td>10</td><td>–</td><td>ns</td></tr>
</table>
Note: A read or write operation following a write operation must be delayed by at least 4 XCLK cycles.</td></tr>
<tr><td>/RD</td><td>IA</td><td>Read Enable. Reading is controlled by the host pulsing /RD input low during the microprocessor bus access cycle. The read timing is:
<table>
<tr><th>Parameter</th><th>Symbol</th><th>Min.</th><th>Max.</th><th>Units</th></tr>
<tr><td>CS Setup Time</td><td>TCS</td><td>0</td><td>–</td><td>ns</td></tr>
<tr><td>RSi Setup Time</td><td>TRS</td><td>10</td><td>–</td><td>ns</td></tr>
<tr><td>Data Access Time</td><td>TDA</td><td>–</td><td>45</td><td>ns</td></tr>
<tr><td>Data Hold Time</td><td>TDHR</td><td>10</td><td>–</td><td>ns</td></tr>
<tr><td>Control Hold Time</td><td>THC</td><td>10</td><td>–</td><td>ns</td></tr>
</table>
Notes:
1. /CS and /RD must not both be continuously active.
A read or write operation following a read operation must be delayed by at least 2 XCLK cycle.</td></tr>
</table>

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FM336 Signals Definitions (Cont'd)

Label	I/O Type	Signal Name/Description
IRQ	OA	**Interrupt Request.** Interrupt request outputs may be connected to the host processor interrupt request input in order to interrupt host program execution for immediate modem service. The IRQ output can be enabled in DSP interface memory to indicate immediate change of conditions in the modem. The use of IRQ is optional depending upon modem application. The IRQ output structure is an open-drain field-effect-transistor (FET). The IRQ output can be wire-ORed with other IRQ lines in the application system. Any of these sources can drive the host interrupt input low, and the host interrupt servicing process normally continues until all interrupt requests have been serviced (all IRQ lines have returned high). Because of the open-drain structure of IRQ#, an external pull-up resistor to +3.3V is required at some point on the IRQ line. The resistor value should be small enough to pull the IRQ line high when all IRQ drivers are off (it must overcome the leakage currents). The resistor value should be large enough to limit the driver sink current to a level acceptable to each driver. If only the modem IRQ# output is used, a resistor value of 5.6K ohms, 20%, 0.25 W, is sufficient.
D0-D7	IA/OB	**Data Lines.** Eight bi-directional data lines (D0–D7) provide parallel transfer of data between the host and the modem. The most significant bit is D7. Data direction is controlled by the Read Enable (READ#-ø2) and Write Enable (WRITE#-R/W#) signals. During a read cycle, data from the DSP interface memory register is gated onto the data bus via three-state drivers in the DSP. These drivers force the data lines high for a one bit, or low for a zero bit. When not read, the three-state drivers assume their high-impedance (off) state. During a write cycle, data from the data bus is copied into the selected DSP interface memory register, with high and low bus levels representing one and zero bit states, respectively.
RS0-RS4	IA/OB	**Register Select Lines.** Five active high Register Select inputs (RS0–RS4) address interface memory registers within the DSP when /CS is low. These lines are typically connected to address lines A0-A4. When selected by /CS low, the DSP decodes RS0 through RS4 to address one of 32 8-bit internal interface memory registers (00-1F). The most significant address bit is RS4 while the least significant address bit is RS0. The selected register can be read from, or written into, via the 8-bit parallel data bus (D0–D7).
OVERHEAD SIGNALS		
VDD1	PWR	3.3V Supply Voltage for DSP Digital Circuits.
VSS	DGND	Digital ground.
VGG	PWR	5V Supply Voltage for DSP Digital Circuits.
MAVSS	AGND	Analog ground.
MAVDD	PWR	5V Supply Voltage for IA Analog Circuits.
VDD	PWR	5V Supply Voltage for IA Digital Circuits.
VSUB	GND	Connect to analog ground.
XCLK	OA	**XCLK Output.** Output clock at 63.5045 MHz, which runs during normal operational mode and turned off during Sleep Mode.
YCLK	OA	**YCLK.** Output clock at 28.224 MHz, which runs during normal operational mode and turned off during Sleep Mode..
Label	**I/O Type**	**Signal Name/Description**
XTALI/CLKIN	I/O	**Crystal In/Clock In.** Connect to an external 28.224 MHz crystal circuit or an external 28.224 MHz oscillator circuit. **Label** **Crystal** **Oscillator** XTALI/CLKIN XTALI CLKIN
XTALO/NC	I/O	**Crystal Out/NC.** Connect to the external crystal circuit return or leave open. **Label** **Crystal** **Oscillator** XTALO/NC XTALO NC
PLL_VDD	PWR	PLL Supply Voltage.
PLL_GND	DGND	PLL Supply Voltage return.
VCORE	PWR	3.3V Supply Voltage. Connect to VDD1.
RESERVED	-	Reserved pins are used for future development and should not be connected to any circuitry.

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3-12 LIU PBA

3-12-1 Summary

LIU(Line Interface Unit) circuit is controlled by the main circuit.
It monitors telephone line and helps interface between the system and the telephone line. It uses transformers (T1,T2)and photo couplers(U2,U3,U4)to control the whole LIU, MODEM/LINE INTERFACE, RING SIGNAL DETECTOR, EXT. and Line Detector.

3-12-2 Modem/Line Interface

This is the path through which transmitted and received data of modem is put in and out.

- K1 Relay : It divides telephone line into external telephone and fax.
- T1 trans former : This component receives and transmits fax image signal from the line to a modem and a modem to the line.
- AC impedance : Normal operation range of LIU is from 15mA to 100mA. DC characteristics depend on the voltage at Q4 and R35. Basic AC impedance is 600Ω but it can be adjusted by changing the value of C2, C3, C32.

3-12-3 Ring Signal Detector

- RING SINALS from the LINE section (TIP , RING)are further passed through C1,R38 and ends up at U2(PC 814). U2 then detects above RING SIGNAL and passes the output to MAIN B'D. R38 limits AC current and comtrols upper and lower REN meter.

3-12-4 Dialer

This system does not use Dialer.

3-12-4-1. MF DIAL

- Default mode it is set in MF. You can change it to DP mode by control of MFP controller.
- MF signal is generated and controled by a Modem in a main board.

3-12-4-2. DP DIAL(Tech Mode)

- DP signal is made by a controller. This signal turns on/off U4. The signal made at that time turns on/off Q13 which interrupts DC current on telephone line and puts out pulse signal on telephone line.

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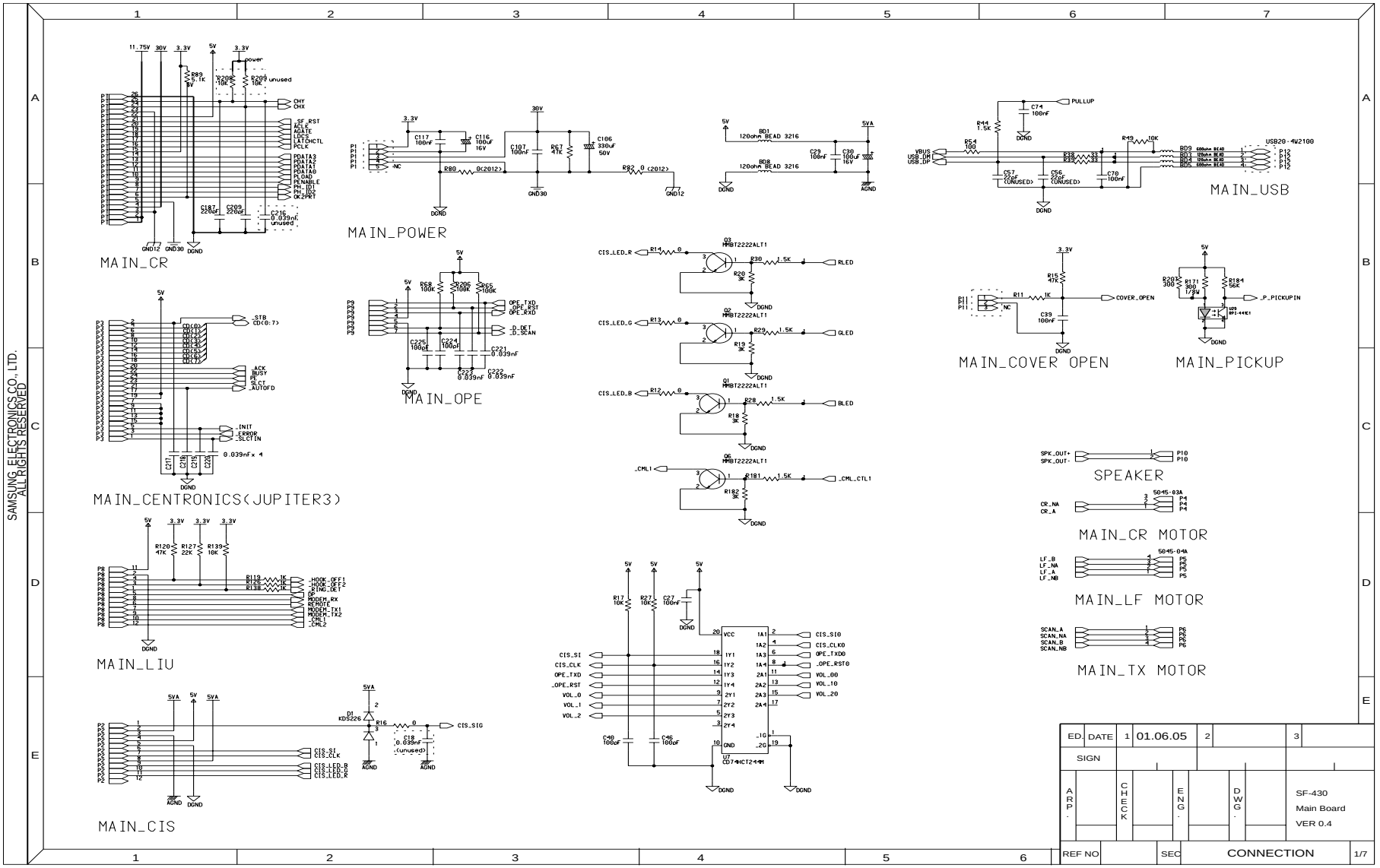
4. Schematic Diagrams

4-1 Main Circuit Diagram (1/7)



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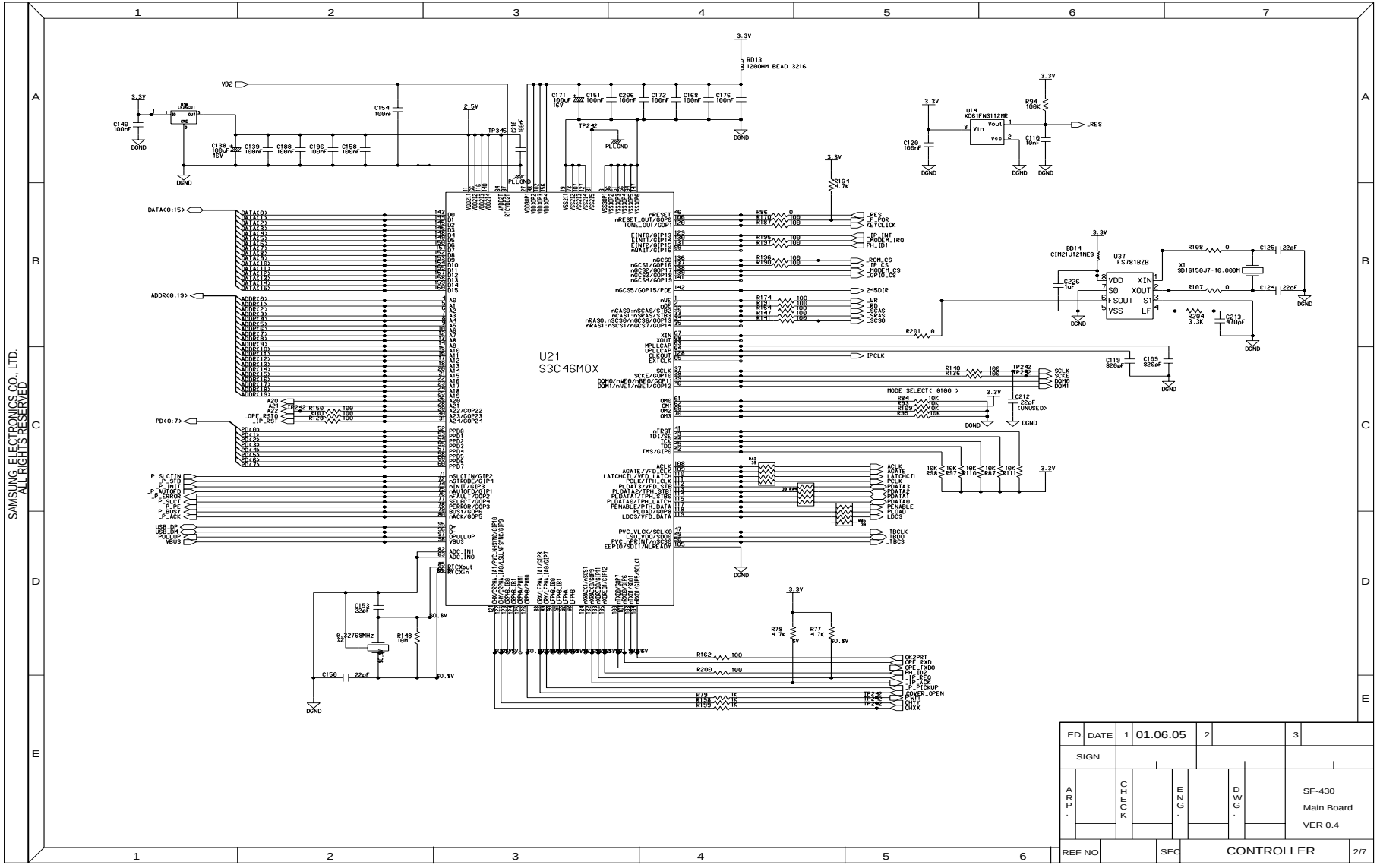
Main Circuit Diagram (2/7)



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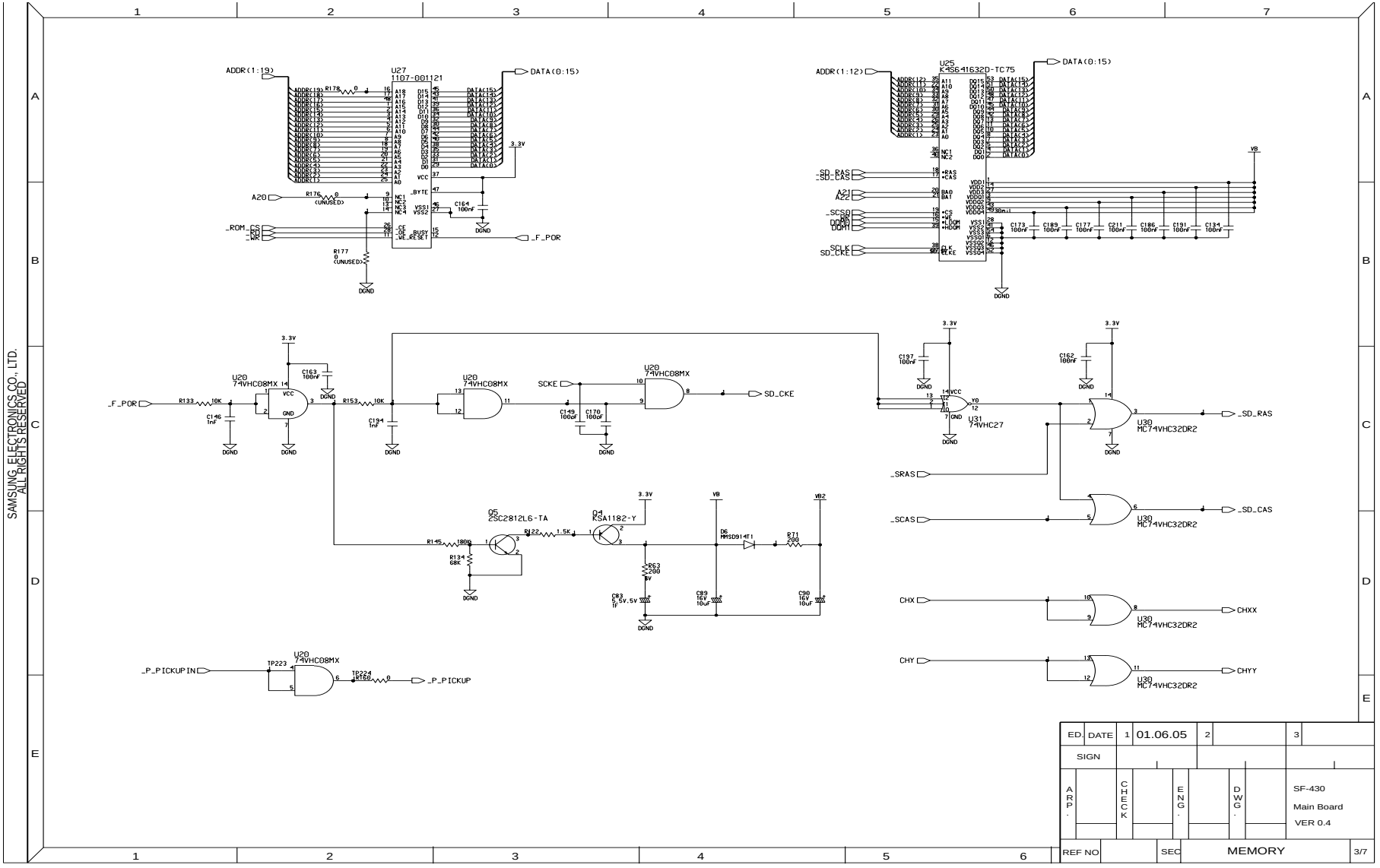
Main Circuit Diagram (3/7)



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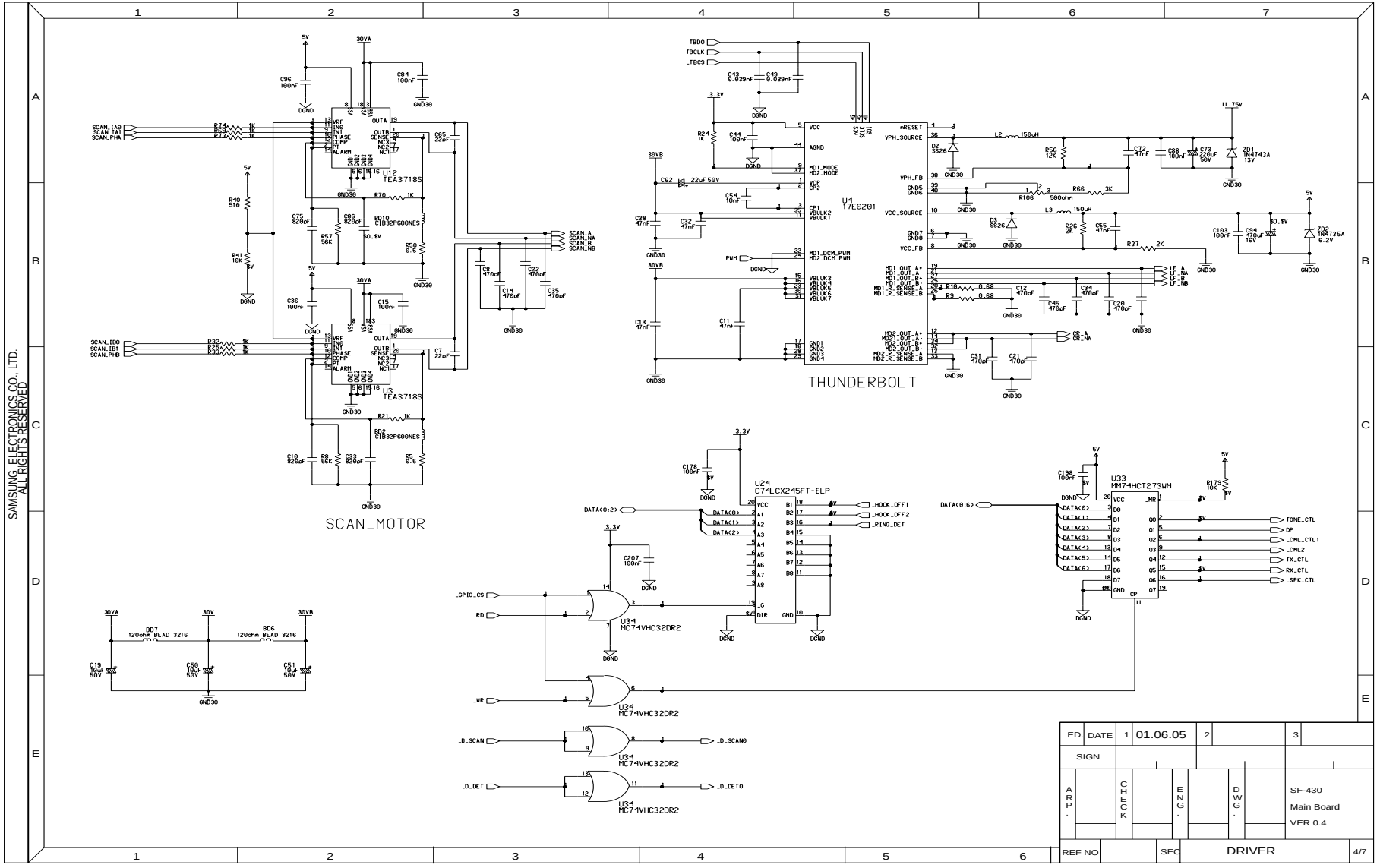
Main Circuit Diagram (4/7)



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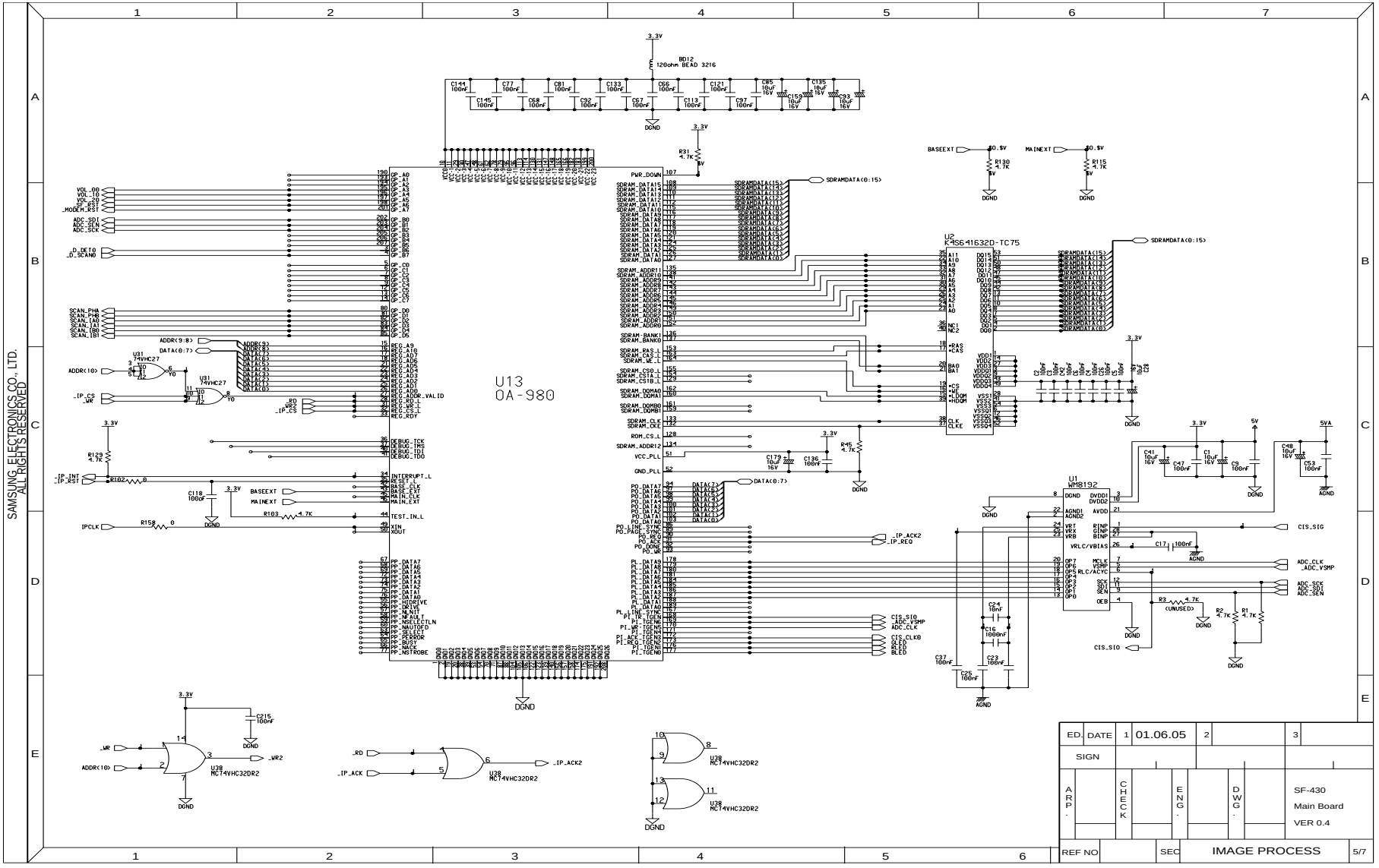
Main Circuit Diagram (5/7)



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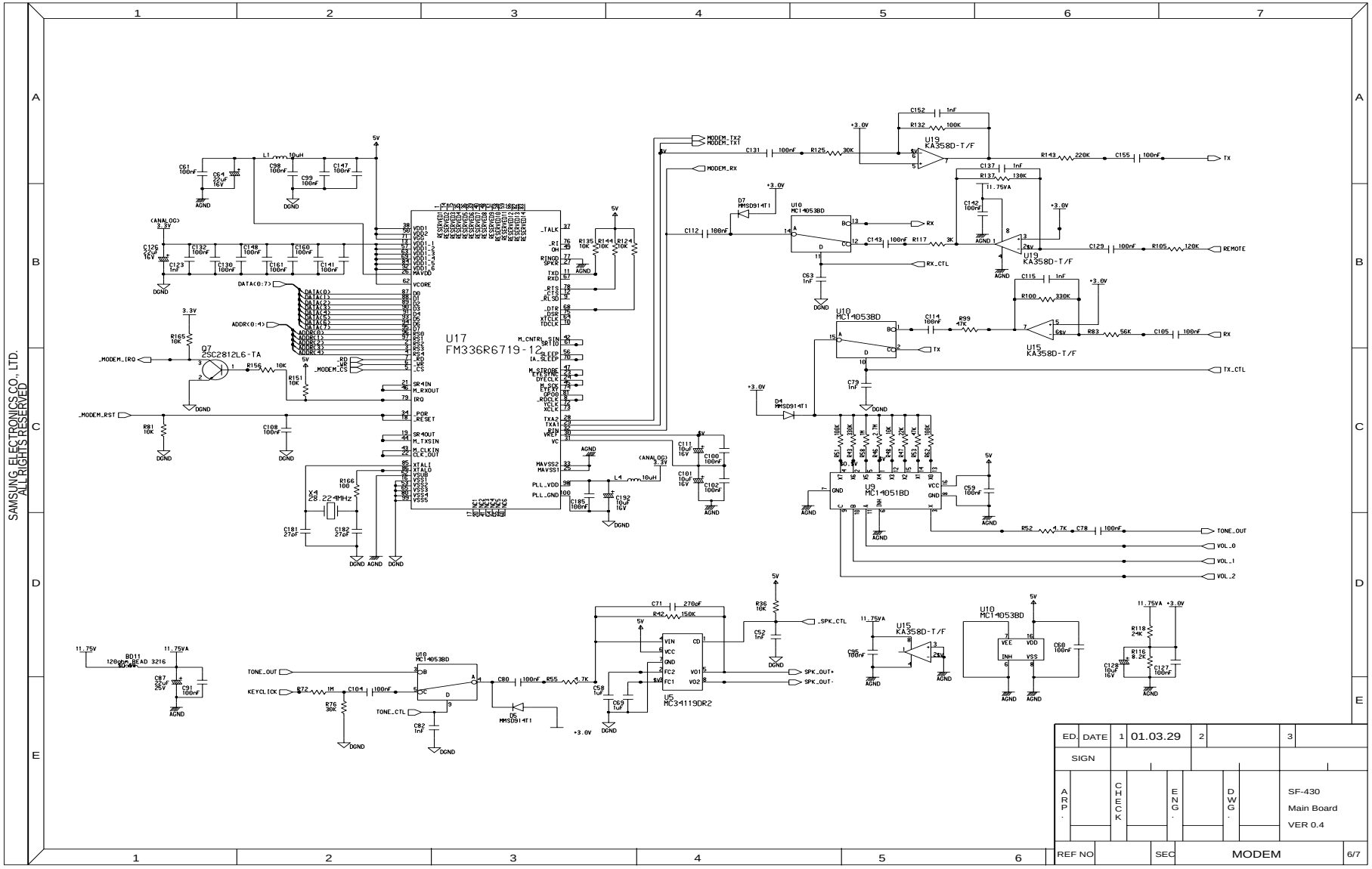
Main Circuit Diagram (6/7)



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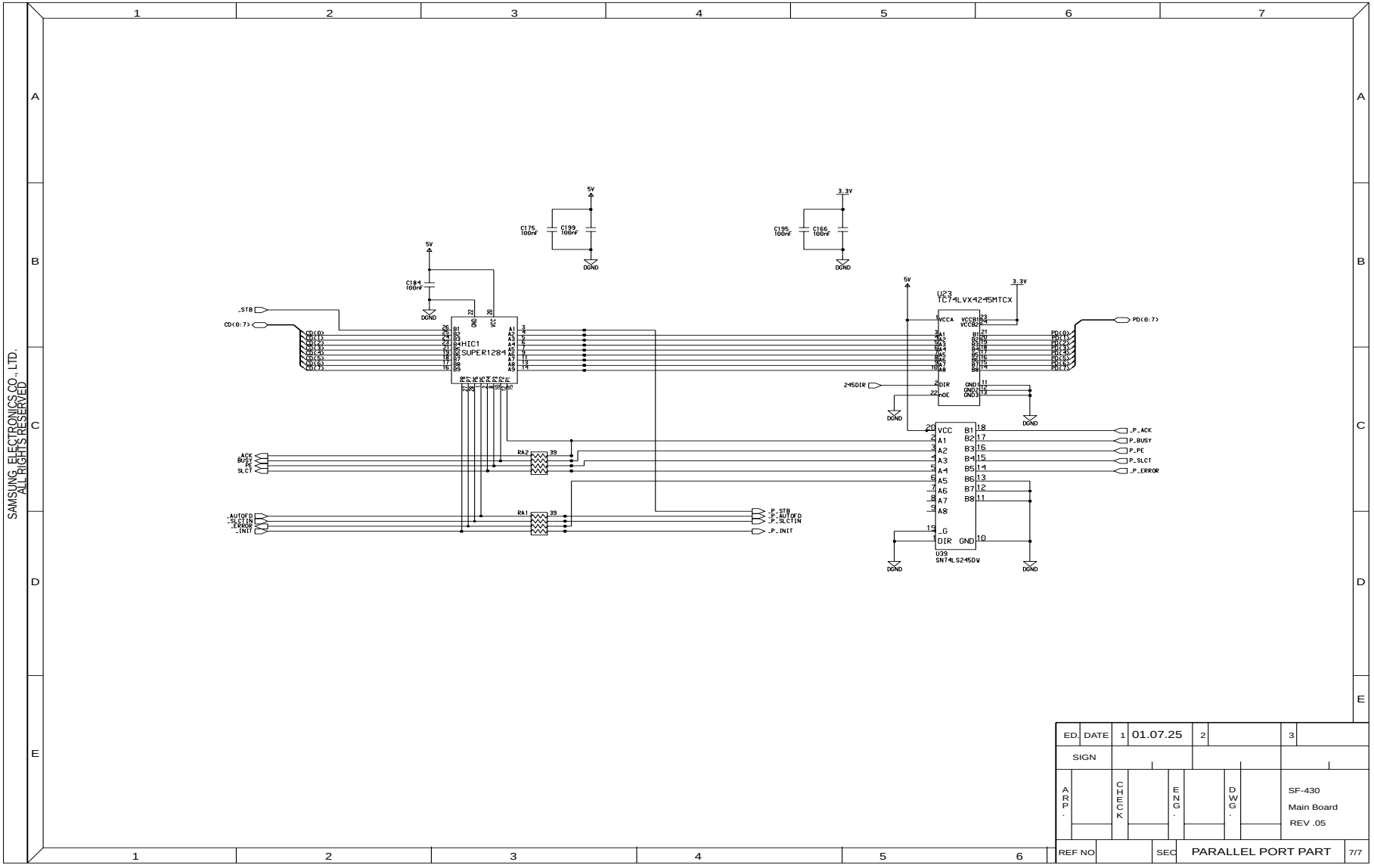
Main Circuit Diagram (7/7)



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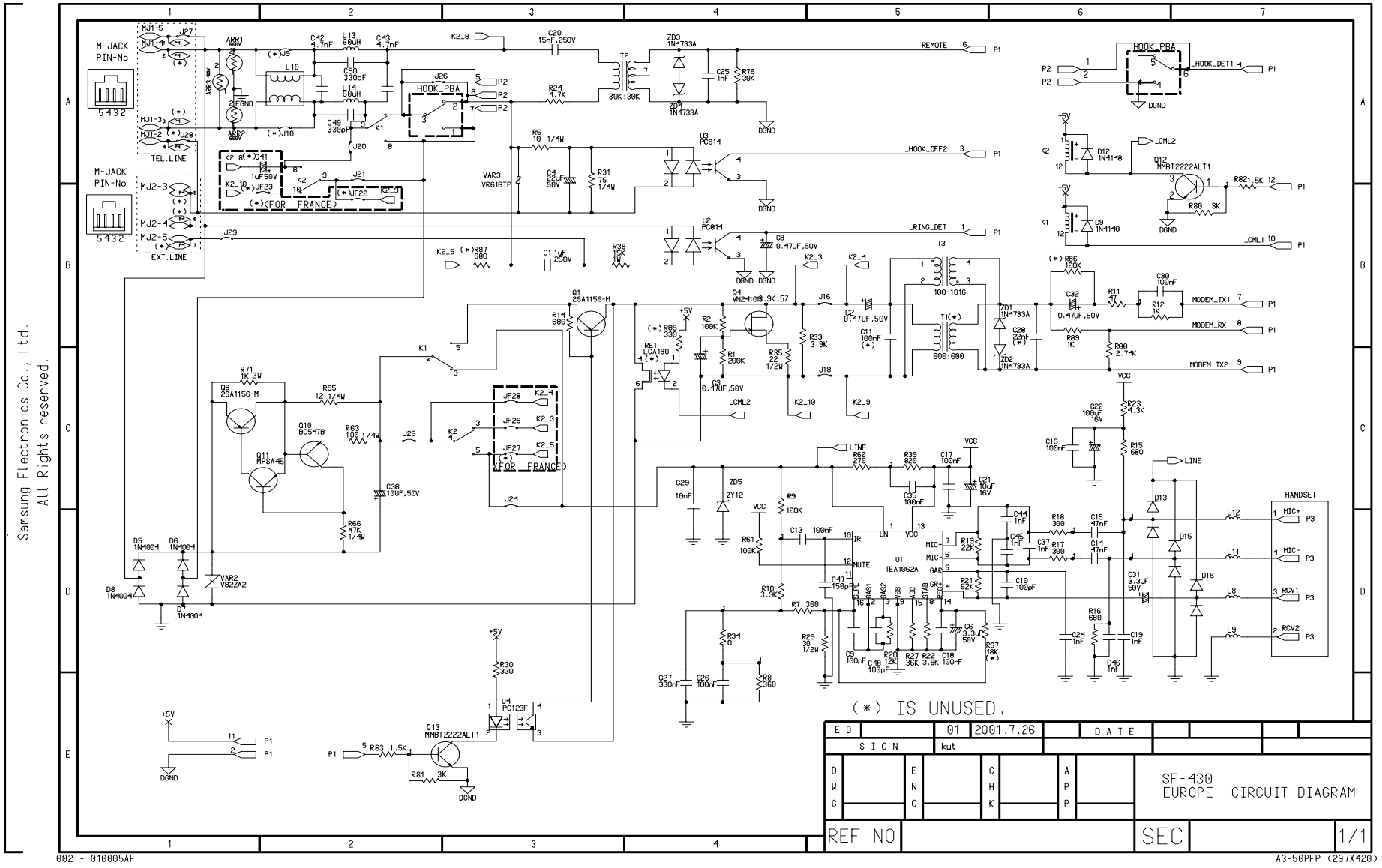
4-2 LIU Circuit Diagram



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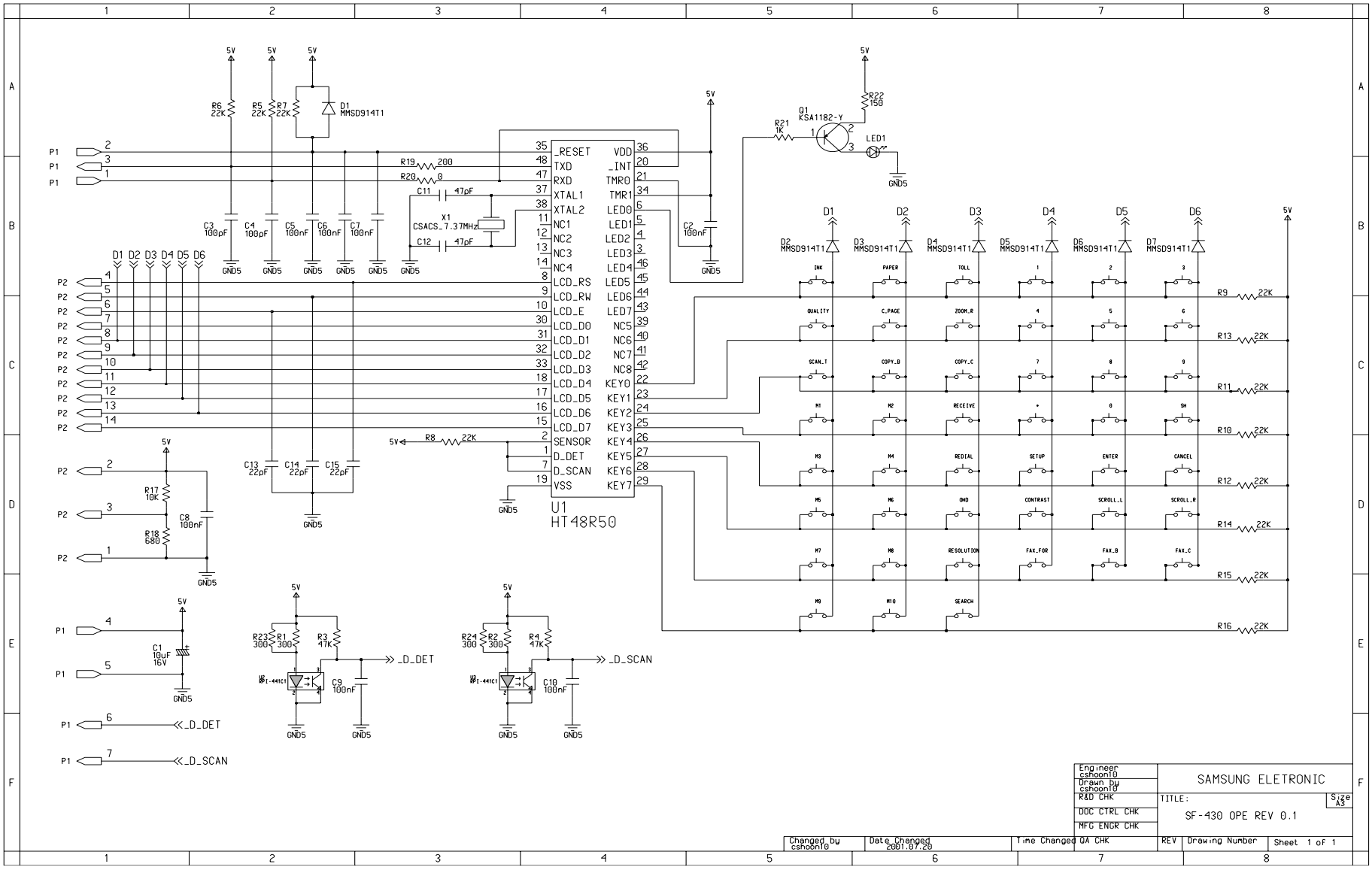

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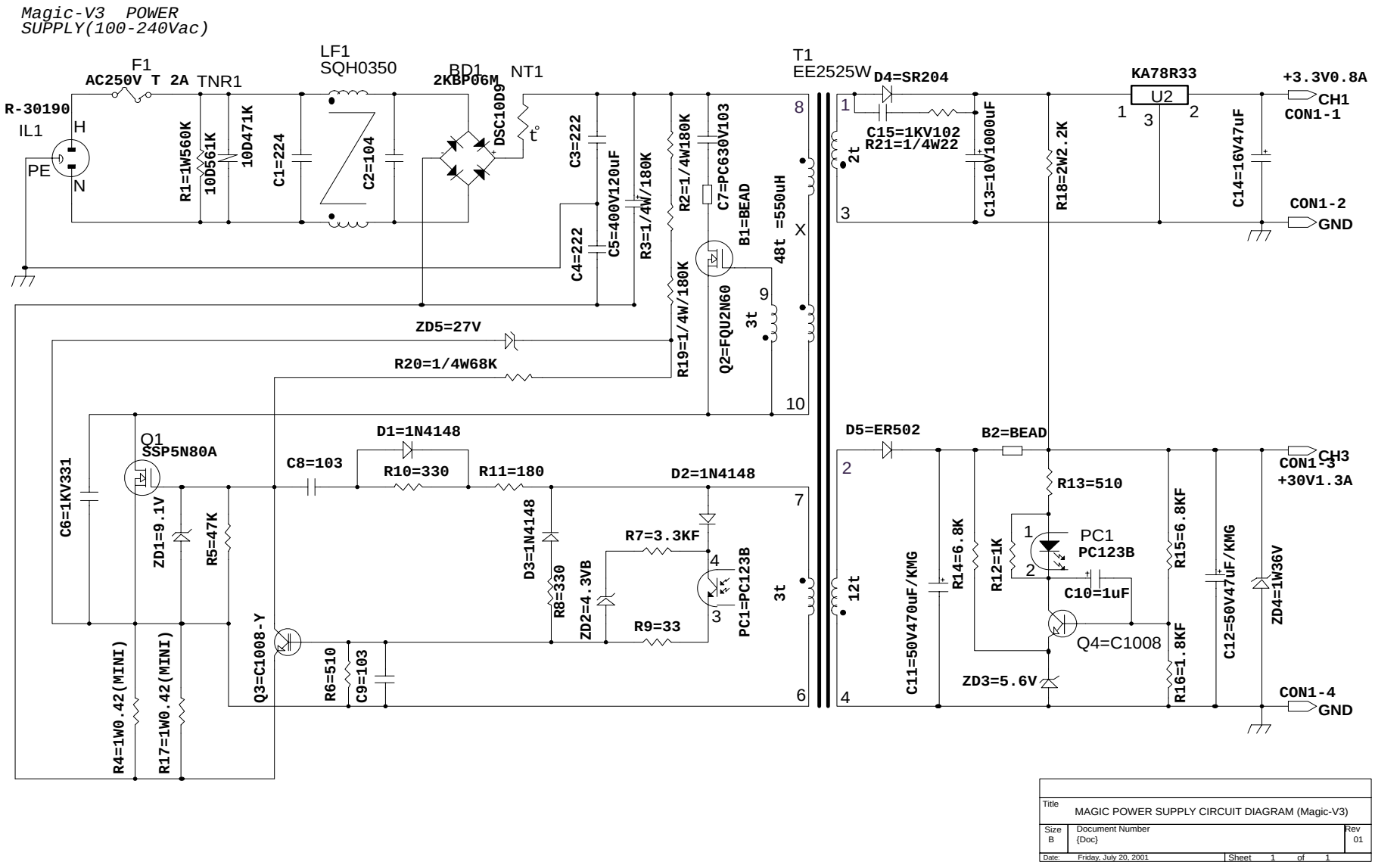
4-4 SMPS Circuit Diagram



Title	MAGIC POWER SUPPLY CIRCUIT DIAGRAM (Magic-V3)	
Size B	Document Number {Doc}	Rev 01
Date: Friday, July 20, 2001	Sheet 1 of 1	

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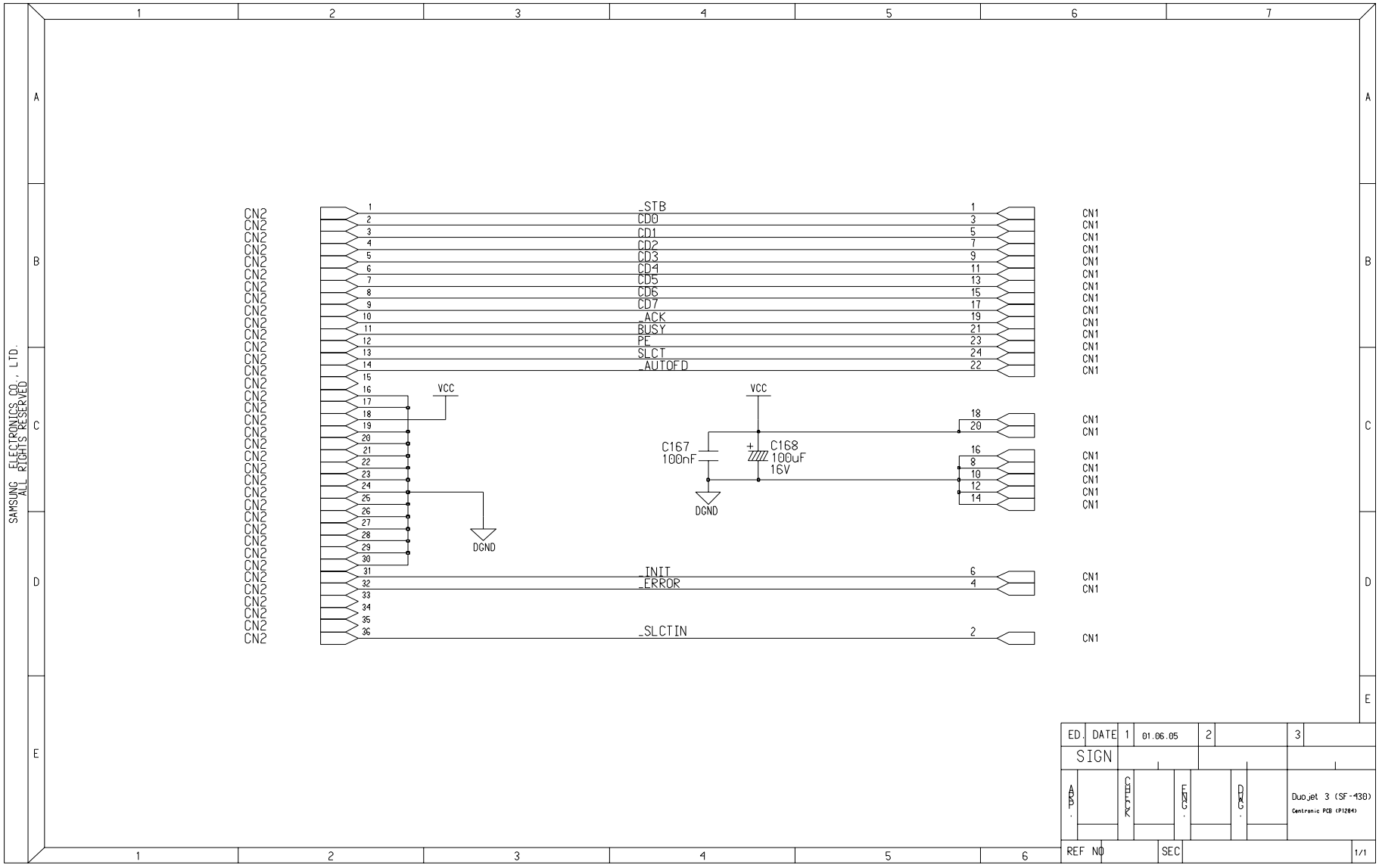
4-5 Centronic PCB(P1284) Diagram



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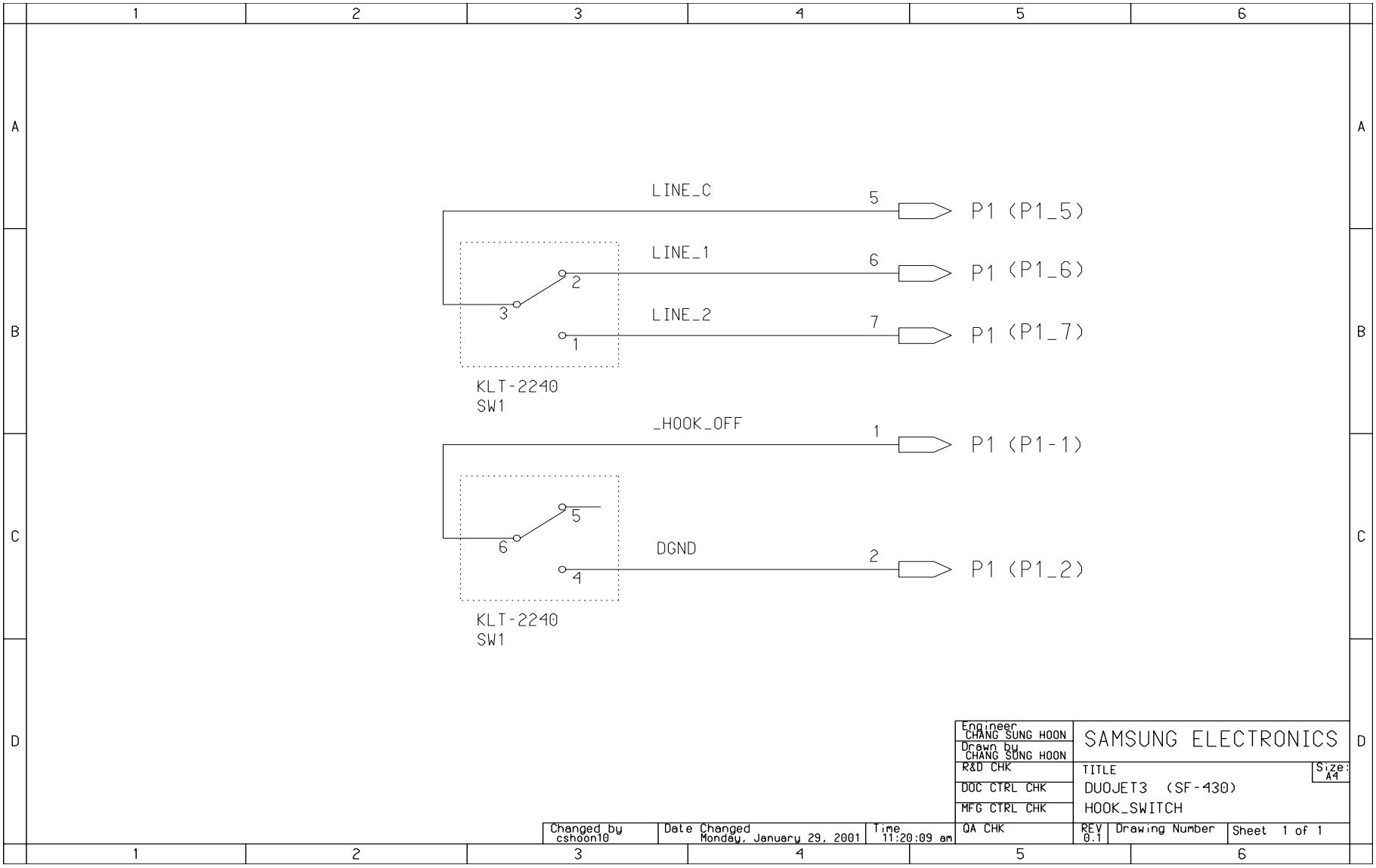
4-6 Hook_Switch Circuit Diagram



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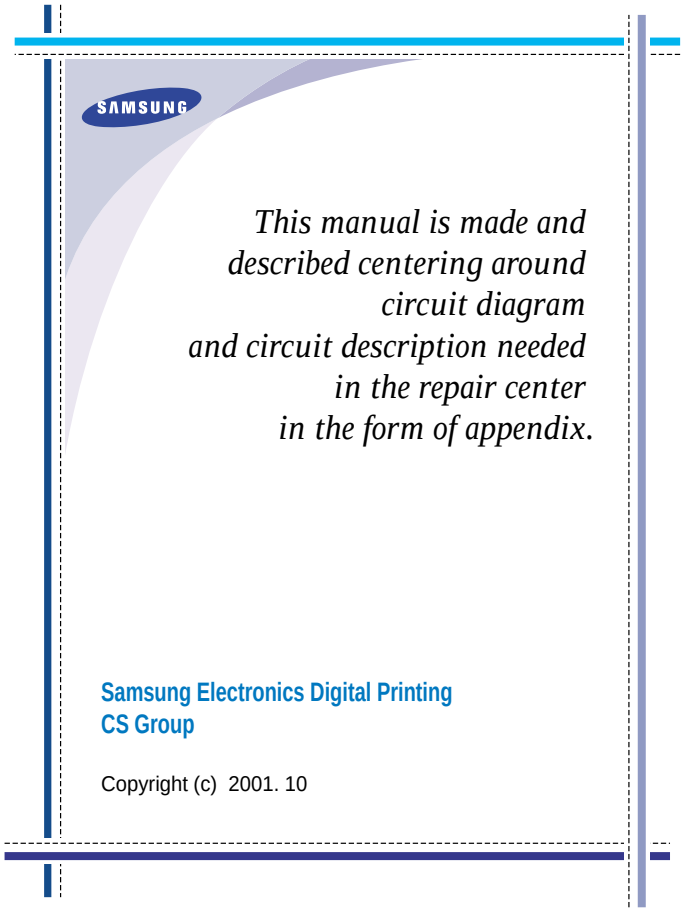
http://getMANUAL.com